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Fostering locality in global value chains

Potential of small-scale milk processors to increase local milk sourcing, create employment and reduce milk powder imports in Burkina Faso

Master's thesis
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Abstract

Imported milk powder has become an essential part of the dairy value chain in urban West Africa, where local milk is little consumed. In Burkina Faso, two diverging policy orientations have emerged to increase the use of locally produced milk: one promoting industrial-scale milk processing and the other supporting small-scale milk processors. This study investigates the potential of small-scale milk processors to source more local milk in the future and the impacts such increase is expected to have both on local employment and milk powder imports. The data were collected and analysed through mixed methods. This includes a survey among 39 milk processors in Bobo-Dioulasso and Ouagadougou, three in-depth case studies as well as interviews with other value chain actors, statistical significance tests and qualitative interview analysis. The results suggest that in Bobo-Dioulasso, local milk represents only 11 % of dairy products produced by small-scale milk processors, the rest being made of milk powder. The potential to increase the current volume is very limited without assistance. This is due to challenges specific to local milk sourcing (e.g. lower profitability of local milk compared to milk powder during the dry season) or common among microentrepreneurs more widely (e.g. economic insecurity). Expanding local milk sourcing could have positive impacts on local employment. In this study, it appears to generate two times more employment than milk powder processing. However, increasing local milk sourcing in small-scale processing units can hardly curb the high level of imported milk powder. Local milk is not necessarily used as a substitute for milk powder and small-scale units account for only a limited part of national imports.

Keywords: small-scale milk processing, milk powder imports, microentrepreneurship, value chain

Résumé

Le lait en poudre importé est devenu une matière première essentielle de la filière lait dans les villes d'Afrique de l'Ouest, où le lait local reste peu consommé. Au Burkina Faso, deux tendances politiques ont émergé pour augmenter la valorisation du lait local : l'une qui promeut la transformation du lait à l'échelle industrielle, et l'autre qui cherche à appuyer les petites unités de transformation, les 'minilaiteries'. Cette étude s'interroge sur le potentiel des minilaiteries de collecter plus de lait local à l'avenir, et les impacts qu'une telle augmentation pourrait avoir sur l'emploi local et sur les importations du lait en poudre. Les données ont été collectées et analysées avec des méthodes à la fois quantitatives et qualitatives : des enquêtes auprès de 39 minilaiteries à Bobo-Dioulasso et à Ouagadougou, trois études de cas, et des entretiens avec d'autres acteurs de la filière, des tests statistiques et de l'analyse qualitative des entretiens. Les résultats indiquent qu'à Bobo-Dioulasso, le lait local ne représente que 11 % des produits laitiers transformés dans les minilaiteries, le reste étant issus du lait en poudre. Le potentiel d'accroître le volume actuel est très limité sans appui aux acteurs de la filière. Ceci est dû aux défis liés à la collecte du lait local (p.ex. une moindre rentabilité du lait local comparé au lait en poudre pendant la saison sèche) ou liés au micro-entrepreneuriat dans son ensemble (p.ex. l'insécurité économique). Augmenter la collecte locale pourrait avoir des impacts positifs sur l'emploi local, car il semble qu'elle crée deux fois plus d'emploi que la transformation du lait en poudre. Cependant, une réduction remarquable des importations du lait en poudre n'est pas envisageable même si les minilaiteries utilisaient plus de lait local. Le lait local n'est pas forcément utilisé en tant que substitut pour le lait en poudre et les minilaiteries n'absorbent qu'une partie limitée des importations totales.

Mots clés : minilaiteries, importation du lait en poudre, microentreprises, filière, chaîne de valeur

Abbreviations

CET	Common External Tariff
CIRAD	Centre de Coopération Internationale en Recherche Agronomique pour le Développement
CIRDES	Centre International de Recherche-Développement sur l'Élevage en zone Sub-humide
COPROLAIT	Coopérative des Producteurs de Lait du bassin laitier de Ouagadougou
EAC	East African Community
ECOWAS	Economic Community of West African States
EUR	Euro
F CFA	West African franc
FAO	Food and Agriculture Organization of the United Nations
FFMP	Fat-filled milk powder
GVC	Global Value Chain
ME	Milk equivalent
MRA	Ministère des Ressources Animales (et Hauliétiques)
MSE	Micro- and small entrepreneurs
NGO	Non-governmental organization
PAPISE	Plan d'Actions et Programme d'Investissement du Sous-secteur de l'Elevage
PAPSA	Projet d'Amélioration de la Productivité et de la Sécurité Alimentaire
PDEL/ZPO	Projet de Développement de l'Elevage Laitier dans la Zone Périurbaine de Ouagadougou
SSMP	Small-scale milk processor
UHT	Ultra-high temperature
UMPL/B	Union Nationale des Minilaiteries et Producteurs du Lait du Burkina

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INTRODUCTION

A glass of powdered milk for breakfast, concentrated milk in afternoon coffee – around 30 % of dairy products consumed in Burkina Faso is of imported origin (FAOSTAT, 2017b, 2017c; MASA, 2013). Admittedly, Burkina Faso does not parade among the largest milk producer or consumer countries in West Africa but it would have resources for it. It has one of the highest bovine headcounts in the region and the country has witnessed an expansion of small-scale milk processing units in the 2000s (Corniaux et al., 2014, pp.38-39). But statistics suggest only around 2 % of the produced milk is processed in milk processing units (MRA, 2015). This paradox is widespread in sub-Saharan Africa: locally produced milk remains in rural zones, often unprocessed, and urban consumers' craving for dairy is satisfied by imported products (see e.g. Corniaux et al., 2007; Katijuonga & Nelgen, 2014). The situation is hardly new. Substantial dairy imports have been flowing into West Africa since the 1970s and the levels are on the rise (FAOSTAT, 2017c). Thus, the local dairy sectors have become part of a global dairy value chain.

In Burkina Faso, the Government has for decades attempted to strengthen the local dairy sector and today, the aim is to reduce dairy imports by 50 % in the near future (MAH, 2012). One of the strategies to this end is to establish the first industrial-scale milk processing unit in Ouagadougou (APA, 2013). This plan, introduced in 2010, caused an outcry among some professional organizations that criticized the project for ignoring small processors and smallholder farmers (Oudet, 2010). The tension between the industrial dairy project and small-scale milk processing sector is evident: whereas the industrial, large-scale approach might be perceived as a more promising solution for up-scaling local milk processing, it might threaten small processors (ibid.). Due to more mechanised processing machinery, it may also generate less employment than small-scale processing that is often artisanal. Small-scale processors, then again, are said to stimulate local economies by providing employment (Corniaux et al., 2014, p.35) but to what extent can they help Burkina Faso to curb dairy imports?

In their book compiling the existing research on small-scale milk processors in West Africa, Corniaux et al. (2014, p.95) argue that the size of these units puts limits on their power to develop the dairy sector on a national level. However, the alleged limits have not been investigated in much detail. Small-scale milk processors have been subject to research mainly in Senegal and Mali, and primarily with a qualitative approach, for instance to depict the historical emergence of small-scale milk processors (Corniaux et al., 2014, Ch.1) or to analyse their business strategies (Ferrari, 2017). There is hardly any evidence to back up

statements on the role small-scale milk processing has in employment generation and no studies have thoroughly analysed its impact on dairy imports. More precisely in Burkina Faso, the data on the dairy value chain in most studies date back to mid-2000s, and are therefore worth updating.

These knowledge gaps and the current tensions between the two processing strategies create a momentum for evaluating the role of small-scale milk processing in Burkina Faso and discussing how to foster locality in the global dairy value chain the country is part of. This thesis will investigate the potential of small-scale milk processors to expand local milk sourcing, i.e. either to start processing local milk or to increase the already processed volumes. Secondly, it will analyse its possible impacts both on employment generation and on milk powder imports. Contrary to previous studies, both quantitative and qualitative methods are used in order to construct a richer understanding of the sector.

The problems highlighted above give rise to following research questions:

> RQ1: What is the contribution of small-scale milk processors to local milk sourcing today? What kind of potential do they have to increase local milk sourcing and why?
>
> RQ2: What impacts can increased local milk sourcing be expected to have on (i) local employment and (ii) milk powder imports and why?

This report is structured around three parts. Part I presents the theoretical framework used in this study (Chapter 1) and outlines the data collection and analysis methodology (Ch. 2). Part II summarizes the state of the art of the research on small-scale milk processing, microentrepreneurship and dairy imports, highlighting knowledge gaps and further justifying the rationale for the chosen research questions (Ch. 3). Part III presents and discusses the findings of this study in thematic chapters on the characteristics of the SSMP sector and its contribution to local milk sourcing (Ch. 4), the upgrading potential of small-scale milk processors (Ch. 5), possible impacts of increased local milk sourcing on employment (Ch. 6) and possible impacts on milk powder imports (Ch. 7). Conclusions resume the main findings and propose directions for future research.

PART I
Research approach

Chapter 1. Theoretical framework

1.1 Epistemological and ontological grounds

Before delving into the theory and design behind this study, it is important to clarify the philosophical grounds it bases on. This research follows the tradition of social constructivism, which has important analytical implications. Social constructivism is not one uniform theory, as it consists of a rich collection of understandings of ontology and epistemology. This study relies on the perspective outlined by Spencer et al. (2014), who emphasize that there is no such thing as one reality or one truth about the reality. Both are considered constructions of human interaction and that is why the aim is not to discover 'the truth' or 'the answer' for the expressed research questions. Rather, the researcher and informant together construct understandings of the studied phenomenon (ibid.).

It is acknowledged that the responses in interviews might be different if the interview was done at a different time, in a different place or by a different person. According to Stake (1995, p.42), "*researcher ultimately comes to offer a personal view*". This means the researcher's earlier beliefs, preconceptions, values and emotions at the moment of the encounter have a great role when making sense of the data. As Chambers (2008, p.11) puts it, collected information should not be called *data*, 'things given' in Latin, but *fabricata*, 'things made'. This may create biases, which can however be minimized through triangulation. Contrary to some other philosophical theories, Stake (1995, pp.107-116) emphasizes that in constructivism, triangulation does not serve to verify if the data are true but to find a wide array of interpretations of the researched phenomenon. Fundamentally, this goes to say that the present study will depict one reality constructed at one moment among a multitude of other possible realities.

1.2 Key concepts

This section will briefly present the key concepts used in this study. The reminder of the chapter outlines the main components of the theoretical framework – value chain approach and microentrepreneurship theories – and how they are combined.

Small-scale milk processor

The Anglophone literature on small-scale milk processors (hereafter called SSMPs) is narrow, so the term 'small-scale milk-processors' is not yet well established. The French concept of 'minilaiteries' is more widespread. This study bases upon the definition of 'minilaiteries' provided by Corniaux et al. (2014, pp.34-35). They define 'minilaiteries' as units that process some hundreds of litres of milk per day, of which at least part is local milk. In contrast, Corniaux et al. (ibid.) consider industrial units dairies processing at least 10 000 litres per day. In this study, units falling between the two categories are considered semi-industrial dairies, and also units processing exclusively milk powder are taken into account.[1]

Potential

What is potential? A widely used definition does not exist but many of them go all the way back to Aristotle and his division between 'potentiality', i.e. having the capacity to become real and 'actuality', i.e. being real (Balskus, 2010). In its simplest way, potential can be understood as some faculty or characteristic that might or might not become real. It is there, even if it is not used (ibid.). Understood like this, evaluating potential is an arduous challenge: one can only see what *is* (actuality) but that tells not much about of what *could be* (potentiality). The concept has also not been used in a standardised manner in entrepreneurship and microbusiness research, so appropriate models are not available. The approach chosen for this study is to evaluate potential firstly by identifying barriers to entry and growth to see what elements would be needed for successful local milk sourcing, and secondly by discussing how likely it is that those elements would be available to SSMPs.

Barriers to entry and growth

Barrier to entry is one of the key notions in economics explaining the entry and exit dynamics and competition within the investigated sector. The earliest conceptualizations date back to the 1950s and they have been continuously revised. The most applied ones, outlined by McAfee et al. (2004), focus on entry costs and emerge from industrial organization economics (see also Porter, 1980), being therefore too narrow for the purpose of this study. Here, barrier to entry is seen more broadly: it might involve economic factors (e.g. access to credit) as well as human capital (e.g. education or training) and gender. The question is not as much how barriers influence rents that accrue to already existing firms (as in many classical theories, see e.g. McAfee et al., 2004) but rather why the entry does not happen in

[1] The study will look into two groups of SSMPs, those processing exclusively milk powder and those who use local milk, either partly or exclusively. The first group is referred to as *powder processors*, and for the second, terms *local milk processing*, *fresh milk processing* and *local milk sourcing* are used interchangeably.

the first place. In this case, what are the obstacles that lower the potential of milk powder-based SSMPs to enter the fresh milk processing sector?
Also the concept of barriers to growth is not used systematically in the literature. It is used in microeconomics to analyse business growth (see e.g. McCormick et al., 1997) or in macroeconomics it can refer to overall economic development (see e.g. Haggard & Tiede, 2011). Moreover, many alternative terms are found, such as 'obstacles, 'determinants' or 'factors' to growth and they are used in various ways, implying that consistent theories of barriers to growth do not exist. In order to remain open for several kinds of obstacles, a barrier to growth is here understood as any kind of factor, either internal or external to the SSMP, which is hindering growth. Since this study is looking at the potential to increase local milk sourcing, 'growth' refers here to growth in terms of volumes of fresh milk processed when processing has already started.

1.3 Value chain approaches

In this study, milk and the accrued dairy products commercialized at Burkinabe markets are considered elements of a *value chain*, a notion that builds upon several theoretical streams. Value chain approaches can be linked to three schools of thought: to industrial organization economics and the idea of one firm being divided into a chain of activities, developed by Michael Porter (1985); the French concept of *filières* primarily analysing the value-addition of agricultural commodities; and currently the most widespread notion in the development literature, Global Value Chains (GVC) coined by Gary Gereffi (Kaplinsky & Morris, 2002, pp.6-8). Raikes et al. (2000) argue that the principles of value chain analysis cannot quite be called 'theories' as such, as they lack consistent background. Rather, they promote the term 'value chain approaches', which is also used here.

The common denominator for those approaches is that they look at the flow of a commodity, in this case milk, from 'upstream' (primary production) through different 'nodes' (processing, distribution) all the way to 'downstream' (consumption) (Figure 1, p.11), measuring the input of resources, and output of products and the creation of value along the chain. Depending on the approach, they analyse the influence of e.g. governance mechanisms and power relations, institutions, or cooperation among value chain actors on the distribution of value (Raikes et al., 2000).
This study has SSMPs as the primary unit of analysis and the objective is not to conduct a full-fletched value chain analysis from up- to downstream. However, value chain approach helps to contextualize the studied phenomenon. Kaplinsky and Morris (2002, p.9) emphasize that "*striving for 'island-efficiency' often [leads] to bottlenecks and systemic inefficiency*". This

means that even the most efficient actors can struggle if the other nodes of the value chain are weak. In the case of SSMPs, their potential to local milk sourcing does not only depend on their internal characteristics but also on other elements of the chain. Therefore, it is important to understand they are part of a chain of actors who all influence each other's performance.

'Globality' in the dairy value chain

Among the three value chain approaches, the concept of Global Value Chains is especially interesting for this study. Fundamentally, the GVC approach shares ideas with dependency theories that were popular in the 1970s, developed by e.g. Raúl Prebisch (1950) and Immanuel Wallerstein (1974). Their theories attribute the unequal distribution of wealth to the interconnection between the global North and the South (the centre and the periphery), in particular, to the fact that the North accumulates wealth by absorbing resources from the South. Kaplinsky and Morris (2002, p.14) highlight that because value chain analysis shows how the value is distributed along the chain, the GVC approach lends itself well to understanding the reasons for global inequalities.

The global dimension is important to understand in this study, since SSMPs are at the intersection of two marketing chains: local chain based on local raw milk and global chain based on imported milk powder. These chains meet at the SSMPs, as they often use both raw materials. It is milk powder that links the Burkinabe processors to milk producers and milk powder traders in the global North.

Interestingly, the dairy value chain is a rare example of what could be called an *inverse* GVC. Usually, the developing South provides the global North with raw materials that are then processed and consumed in the North (e.g. coffee, cocoa, rubber, palm oil). In the dairy economy, it is the North that produces milk, processes it, and exports to the South, where it is either processed further or only consumed. Despite the contrary direction of the stream, the overall distribution of wealth is not necessarily fairer than in conventional GVCs. It might still be that the producers and/or traders of the North reap the most of the benefits. In the local value chain, on the contrary, all value addition and benefits stay in the South.

Investigating power relations and value addition along and between the two value chains is not the main aim of this study but these questions are necessary to acknowledge in order to understand what is in play: the possibility for local value addition and thereby decreasing dependency of the global North. The question of self-sufficiency will be further discussed in the literature review.[2]

[2] Because the understanding of value chains in this study does not fully converge with the classical GVC approach (see *Limitations of value chain approaches* below), the concept 'global value chains'

Elements of value chain analysis

Kaplinsky and Morris (2002, Preface) remind that analysing all elements of a value chain would be exhausting and usually only some of them are investigated at a time. In this study, upgrading is the most central one.

The concept of *upgrading* refers to several types of changes that may occur in the investigated node. Kaplinsky and Morris (2002, p.38) differentiate between product upgrading (producing a new product), process upgrading (changing technique), functional upgrading (occupying a new node in the chain, e.g. processor engages in distribution), and inter-sectoral upgrading (shifting to another value chain). In addition, Riisgaard et al. (2010) present volume upgrading as one type of upgrading, i.e. scaling up produced quantities. When investigating local milk sourcing, volume-, process- and product upgrading are all important. Some SSMPs are already engaged in fresh milk processing, and for them the question is whether they can increase the processed volumes. For those SSMPs who are today using only milk powder, starting local milk sourcing would mean process and possibly product upgrading, depending on what kind of products fresh milk would be used for[3]. It is important to note that in this study, the term upgrading does not have any normative connotations – the following analysis will show that starting or increasing fresh milk processing is not necessarily more desired or valued than milk powder processing.

In addition, the concepts of enabling environment and horizontal and vertical linkages will be used. The idea of *enabling environment* is here understood broadly, referring to the overall context: structures and actors that are not active parts of the chain but that influence the chain actors, such as macro-economic dynamics, financial institutions and service providers (Konig et al., 2013). In this case, also environmental conditions are considered, as they have an important bearing on milk production. *Horizontal linkages* refer to cooperation between actors in the same node of the value chain (e.g. SSMPs acting together), and *vertical linkages* occur between the nodes (e.g. livestock farmers and SSMPs together) (Kaplinsky & Morris, 2002, p.98).

Limitations of value chain approaches

Value chain approaches give an overall understanding of the dairy sector but they are alone insufficient for the purpose of this study. Firstly, they focus on the notion of value, so simply put, one node is successful if it creates high added value. The employment impact behind

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hereafter refers to the view outlined in this chapter, and not to the Global Value Chain theory in its purest form.

[3] All milk powder-based SSMPs in this study process yoghurt. If they changed their raw material into fresh milk, this would be understood as process upgrading. If new products (e.g. liquid milk, cream or cheese) would come into picture, this would be process *and* product upgrading.)

value addition is usually not analysed. A conventional value chain research would look at the distribution of value *between* the nodes but in this study, the main focus is on how the value creates income *within* one node. In other words, what kind of employment that node manages to create.

Secondly, systemic thinking inherent in value chain approach requires analysing structures. These can be power relations between the nodes or the impact of demand at downstream to producers upstream (see e.g. Gereffi et al., 2005; Kaplinsky & Morris, 2002, pp.55-59). Less attention is paid to the logics of actors in the chain, i.e. their behaviour and the reasons behind that. However, human action and individuals still have a large impact on how businesses evolve especially in the case of microentrepreneurs (Frese & de Kruif, 2000, p.2). This is why the framework used in this study does not circumscribe to value chain approach but is complemented with other theories that have entrepreneurs as individuals at the centre. These theories are outlined below.

1.4 Micro- and small entrepreneurs

SSMPs can be conceptualized as micro- and small enterprises (MSE). Like in value chain approaches, the literature on MSEs cannot be called a theory, perhaps not even an approach, as it does not form such a network of concepts as value chain approaches do. The notions of different kinds of MSEs and factors influencing their development will be useful when analysing the upgrading potential of SSMPs.

Microenterprise and microbusiness are concepts that entered the literature on international development already in the 1980s (e.g. Meyer, 1989; Sheldon, 1987). Later on, the spread of microcredit programs paved the way for establishing the term and by the end of the 1990s, the number of publications on microbusinesses or microenterprises boomed. This was an additional category to the established division of small, medium and large enterprises that could not quite grasp the realities of very small firms in the global South. Today, micro- and small enterprises are widely used terms, the usual definition being based on the number of employees: 1-10 for microbusinesses and up to 50 for small enterprises (OECD, 2005).[4]

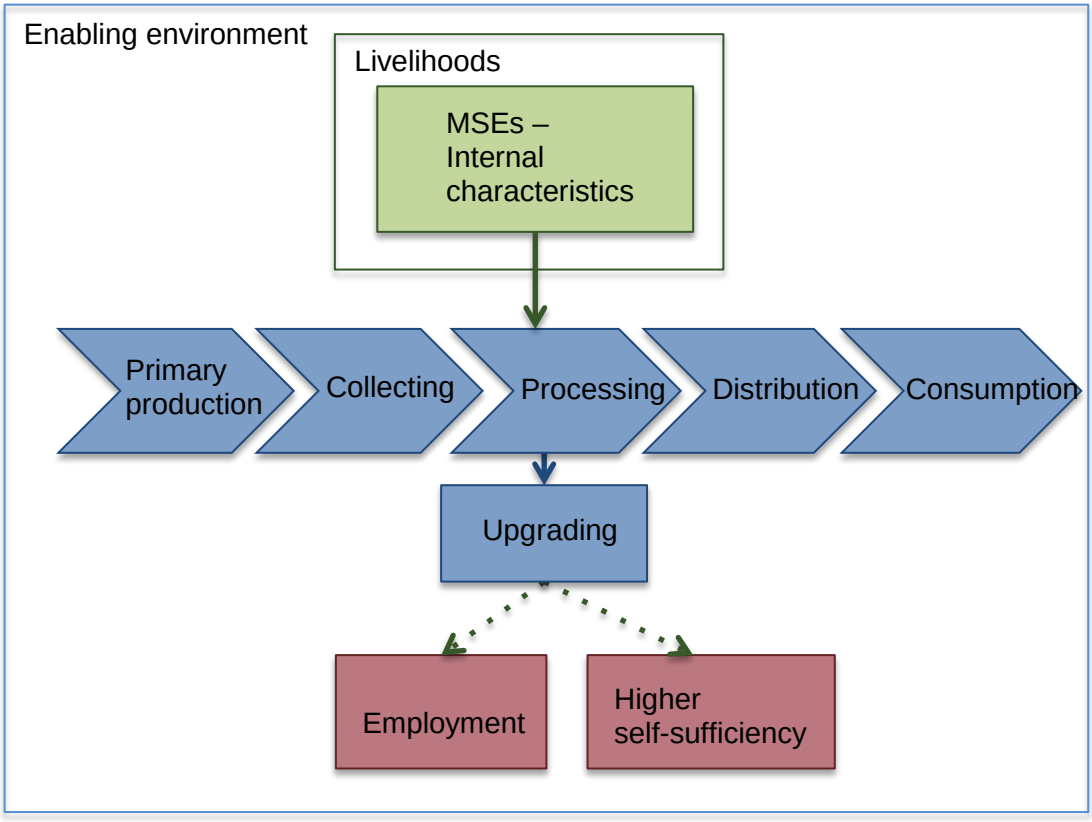
When researching entrepreneurs in the global South, one soon finds that theories applied in the Western world are insufficient. A classical Schumpeterian view of an entrepreneur is an innovator who finds 'new combinations' of existing resources, creates new markets, reforms current patterns (Schumpeter, 1961 in Kaplinsky & Morris, 2002, p.26). Another important

[4] The terms microbusiness and microenterprise will be used interchangeably.

common characteristic for entrepreneurs is willingness and ability to take risks (Douglas & Shepherd, 2002; Evans & Jovanovic, 1989). To give nuances to these views, theories describing entrepreneurs outside the Western world have emerged since the late 1990s. Carl Liedholm and Donald C. Mead are some of the pioneering researchers showing that in fact, many of the self-employed people in the global South are not innovators or growth-seeking businesswomen and –men but rather they occupy themselves in 'survival-type activities' (Mead & Liedholm, 1998, p.70). Since the late 1990s, the idea of *survival entrepreneurs* has gained more ground, today meaning microbusinesses of usually one to four people, often working in small commerce or services (see e.g. Berner et al., 2012). Berner et al. (ibid.) note that most importantly, these entrepreneurs focus their attention on feeding their families, survival, rather than expanding their business. The theory holds that they avoid taking major risks and tend to produce identical services and products like the others, going clearly against the classical theories of entrepreneurs. The opposite of survivals, according to Berner et al. (ibid.), are *growth-oriented entrepreneurs*, who do seek for growth and are in that way closer to the conventional model of entrepreneurs.

In contrast to structure-centred value chain approaches, the literature on MSEs recognizes both the importance of entrepreneurs as actors and the structure they are embedded in. Frese and de Kruif (2000) note that microenterprises are to a large extent products of their founders and owners. They emphasize that it is their internal factors and psychological processes (e.g. human capital and risk-taking strategy) that determine how the business develops. On the contrary, Grimm et al. (2012) highlight the importance of macroeconomic conditions, like the structure of the economy and access to credit. Verrest (2013) goes further and insists on studying microentrepreneurs from a more comprehensive livelihoods perspective, not only considering the enabling environment that Grimm et al. (2012) emphasize, but taking the household's circumstances in all its complexity into account. All these aspects will not be investigated but rather these ideas will help frame the analysis.

Figure 1. Theoretical framework



In summary, the theoretical framework (Figure 1) is understood as follows: SSMPs are part of a value chain (blue colour), which is embedded in an enabling environment. Their upgrading potential is influenced by the enabling environment, other nodes of the value chain, and their internal characteristics as microentrepreneurs (green colour). The internal characteristics, then again, are affected by the livelihoods context of the entrepreneurs. Upgrading can have various impacts but here, only impacts (red colour) on employment generation and national milk self-sufficiency are analysed.

Chapter 2. Methodology

This study has a mixed methods approach, as it combines a quantitative survey, qualitative interviews, as well as three case studies. The present chapter will first give an overview of the study design (2.1), followed by a justification for mixed methods (2.2), and a description of the purpose and design of the case studies (2.3). After this, each data collection method will be described (2.4), as well as the analysis methods (2.5). The last section will discuss limitations and biases (2.6).

2.1 Overview of the study design

Table 1 summarises the research process of this study, starting from the survey, which led to case studies, and was then followed by a range of complementary methods.

Table 1. Research process and data collection methods

Method	Informant	n
Survey	Distributors	20
	SSMPs	42
Case studies		
Semi-structured interviews	Case study informants	13
Observation	Case study SSMPs	(48 hours)
Complementary methods		
Semi-structured interviews	Key informants	18
Rapid semi-structured interviews	Wholesalers and milk powder importers	13
	Milk producers	15
Complementary interviews	SSMPs	13
Participatory analysis	SSMPs	22
Group interview	Milk collection centre	1
Workshop	Milk producers, milk collectors, SSMPs, MRA	(6 hours)
Total interviews		**157**

The data were collected during 4-month long fieldwork in Bobo-Dioulasso, Burkina Faso, including three one-week stays in the capital Ouagadougou. The fieldwork was conducted in collaboration with CIRDES (Centre International de Recherche-Développement sur l'Élevage en zone Sub-humide) and CIRAD (Centre de Coopération Internationale en Recherche Agronomique pour le Développement) that provided the needed resources (financing, interpreter and administrative help, among others) for the study. The fieldwork context will be further described in Chapter 2.4.

2.2 Mixed methods

The benefits of combining qualitative and quantitative methods have been widely acknowledged, since using them alone can yield very different results about the same research question (Greene et al., 1989). Quantitative research aims at discovering generalisations and answers to questions such as 'how many' or 'how often' (Yin, 2008, Ch.1). In this study, deriving quantifications is central especially in order to map out the dairy value chain to see which role local milk currently occupies. Qualitative methods allow digging deeper and can explain how and why such patterns emerge (ibid.). In particular, qualitative data help in analysing whether statistically significant correlations have some causal relations or whether they are only coincidental occurrences.

The notion of 'mixing' methods is to some extent debatable, as it retains the idea of a dichotomous division between them – as if one could identify the point at which research becomes qualitative or quantitative. Also in this study, the borderline between qualitative and quantitative methods is sometimes vague. For example, several survey questions were used to find out the share of local milk in total production but sometimes the given quantities were contradictory. Only by analysing the overall discourse and qualitative descriptions it was possible to derive a number that seems to best correspond to the respondent's reality. This type of reiteration was continuous.

In this study, mixing was done in two ways: 'sequentially' during data collection and 'simultaneously' during reiterative data analysis (Bryman, 2006, p.98). This yielded four types of benefits, classified by Greene et al. (1989, p.259). Firstly, the quantitative survey was used for 'method development', i.e. to help to design the next methods. Three case studies[5] were identified and designed based on the survey. The survey also gave rise to a participatory analysis of the survey results at the end of the data collection period. Secondly, mixed methods approach was used for the sake of triangulation. This study diverges,

[5] See Chapter 2.3

however, from the idea of triangulation presented by Greene et al. (1989). They have a rather positivistic approach to triangulation, as they aim at reducing heterogeneity in order to find the most valid data. On the contrary, this study builds around a constructivist perspective where triangulation is seen more as a means to increase the number of interpretations to analyse (Stake, 1995, pp.107-116). The third benefit of mixed methods is that it brought 'complementarity', i.e. findings gained through one approach were used to illustrate findings from the other, for example case studies illustrate findings from statistical tests (Greene et al., 1989, p.259). Lastly, it helped to discover contradictions, which allowed 'initiation' of new questions and perspectives (ibid.). This will be shown in Chapter 5 when quantitative data and qualitative accounts of entry barriers diverge.

2.3 Case study approach

Case study approach has a central role in the qualitative part of this study. The survey interviews provided qualitative information alongside quantified data but the case study approach allowed the SSMPs to be analysed more in-depth. Case study approach has been criticized for being of little value in scientific research, as it falls short in providing generalisations (Flyvbjerg, 2011). In his text correcting common 'misunderstandings' about case studies, Flyvbjerg asserts that in order to reach superior, expert level of understanding a phenomenon, one must have experience in numerous specific cases. Learning from particularities is what enables one to transcend from being a generalist to being an expert (ibid.). Deeper analysis appeared all the more useful when conducting research in a context unknown for the researcher beforehand. How does one interpret survey results when the people and context behind the responses are unfamiliar? Why do they answer the way they do? This study relies on three one-week case studies, which is hardly enough to gain a deep understanding of the personalities and realities of the informants. Nonetheless, it did provide precious insight to nuance the survey data.

Stake (1995, pp.3-4) makes a division between 'intrinsic' and 'instrumental' case studies. This study has an instrumental approach, as the primary aim is to understand a phenomenon – the potential of SSMPs to source local milk, and the consequent impacts – instead of the chosen cases *per se* as in the intrinsic approach (ibid.). This is why the description of the cases in the following analysis remains brief. Overall, the cases do not take a central role in the analysis. Rather, the data gathered through this approach are used to illustrate findings the other methods yielded.

The design of the cases is what Yin (2008, Ch.2) calls 'multiple' and 'holistic' case study. Three SSMPs were chosen and each was investigated as one singular entity, holistically[6]. As the aim of the approach is to focus on only few cases, the choice of cases is of critical importance. Two 'representative' cases (ibid.) and one 'deviant' case (Flyvbjerg, 2011, p.307) were identified according to the survey responses. In practise, after having conducted the survey, two cases seemed to correspond to an average of two kinds of SSMPs: one (Case A) being an average milk powder processor of very small scale and the other (Case C) representing a successful mixed fresh milk-milk powder processor who has already managed to scale up. Case B was an informant whose survey responses were atypical. This SSMP is of small size and seemed in many ways similar to milk powder processors. Yet, the head of unit was advocating local milk processing and insisted on using fresh milk when it was available. This called for further investigation and was therefore chosen as a deviant case.

Between 4-6 working days were spent in each SSMP at times that were convenient for the personnel. Data collection methods used were semi-structured interviews, observation, informal discussions and, when possible, document analysis. Document analysis consisted of investigating bookkeeping of Cases B and C but in both cases, records were very scant. In Case A, no bookkeeping was practiced at all. The other methods are further described in the following section.

The use of multiple methods is essential when trying to gain a rich insight of the cases and it also allows triangulation. In the case studies, triangulation was not only done by using different methods but also as '*data source triangulation*' (Stake, 1995, p.112) by interviewing as many people (like the head of unit, employees and family members) as possible in each SSMP. What proved essential during the case study period was the room left for the unexpected. The strategy was to spend time at the case SSMPs without making formal interview appointments with the personnel. This left time for open observation and spontaneous discussions on issues that were not included on pre-prepared interview guides, which helped to interpret the data gathered in formal interviews.

[6] Yin (2008, Ch. 2) positions case studies along two dimensions: the number of cases (single and multiple cases) and the nature of cases (embedded and holistic). Embedded case study would mean that separate cases form an umbrella case together, e.g. an education program might be one embedded case consisting of three cases of schools that took part of that program.

2.4 Data collection methods

Study site

The primary study site for fieldwork (see pictures in Appendix 7) was the city of Bobo-Dioulasso, Burkina Faso. Burkina Faso is a landlocked country in the Western Sahel, surrounded by the Saharan desert in the north and reaching Sudanian Savannas in the south. The dry season with practically no rainfall is around 7-8 months long in most parts of the country (usually between November and May), and the rainy season yields between 400-1100 mm rainfall per year (FAO, 2001). Some 40 % of the total population of around 18 million people live below the national poverty line of 421 F CFA per day, which corresponds to around 0,65 EUR (World Bank, 2016a).

Map 1. Burkina Faso

Source: Adapted from Google Earth (2017)

Bobo-Dioulasso is the second most important city of Burkina Faso in terms of population and economic activity. It is estimated to have a population of around 900 000 people and agricultural activities are common in and around the city (Dossa et al., 2015; Hamadou & Kiendrébéogo, 2004). In 2001, Hamadou et al. (2003) identified over 450 livestock farms in an area of 50km around Bobo-Dioulasso, who produce around 1 400 - 1 500 tonnes of milk annually. The vast majority are extensive livestock farmers, i.e. they depend on natural pastures for cattle feed (ibid.). Although Bobo-Dioulasso has Sudanian climate with as much as 900-1000 mm of annual precipitation, sharp seasonal changes in climate creates notable

variation in the daily milk yield around the year: daily production drops as much as 40 % during the dry season in extensive farms compared to the yield during the rainy season (Hamadou & Kiendrébéogo, 2004).

Literature review

Relevant literature was reviewed in two phases, before and after fieldwork. Literature research was done using key word search in ProQuest Database, Science Direct and Google Scholar. In addition, a wide collection of literature provided by the partnering organizations CIRAD and CIRDES was analysed. Bibliographic references of each source were reviewed, which led to additional sources not caught through the key word search.

Survey

Survey method was used in order to gather generalizable data on SSMP characteristics and the quantities of local milk and milk powder processed (see questionnaire in Appendix 1). The aim was to reach as many SSMPs in the study area as possible. The number of the sample population was not known beforehand, so the first task was to identify how many and which kind of processors there are in Bobo-Dioulasso. This was done by visiting food distributors, where the names and contacts of local dairy processors were collected from product labels. Altogether 45 retailers (35 boutiques, eight mini-markets, two supermarkets) were visited in seven districts of the city (four residential areas, two commercial, one industrial). Altogether 50 SSMPs were identified in an area of max. 10 km from the city centre. After a round of calls, 15 of them were found to use local milk.

Table 2. Survey sampling frame

	Local milk	No local milk	Total
SSMPs identified in Bobo-Dioulasso	15	35	50
... of which surveyed	14	20	34
... excluded after survey	-	3	3
SSMPs surveyed in Ouagadougou	8	-	8
Final survey sample (Bobo-D. + Ouagadougou)	22	17	**39**

Two independent sub-samples were constructed: all local milk users that were available (14 out of 15), and 20 powder processors chosen randomly through a lottery. In order to gain a balanced overall sample, eight more local milk users were sought in Ouagadougou, using the same identification method[7]. The two independent sample strata were later used for comparative statistical analyses. Table 2 outlines the sampling frame.

This sampling strategy has its shortcomings. In Bobo-Dioulasso, dairy products are sold both in retail shops, open markets, restaurants/cafés and by street vendors but for this study, only products sold in retail shops, with labels on, were included. These inclusion criteria were chosen for several reasons. Firstly, the preparatory interviews with local guides suggested that retail shops account for a great deal of local dairy products consumed. Secondly, these criteria were expected to filter out SSMPs that are only starting their activities, that work irregularly or that process very small quantities. This allowed focusing on more established businesses. The third reason was convenience, as contact information was easy to collect from product labels. However, concentrating on labelled products meant excluding restaurants and market vendors that might process considerable amounts of dairy products, as well as minor and irregular processors whose answers might unveil different barriers to entry and growth than those captured in this analysis.

The survey was constructed based on guidelines in Marsden and Wright (2010). Questions were mainly open, as this allows the richness of responses and is assumed to create more accurate answers when asking for quantities (Krosnick & Presser, 2010, pp.266-268). The interviews were conducted mainly in French and when needed, in a local language *dioula* with an interpreter. The interviews lasted between 40 minutes to 2,5 hours, in general for one hour. Notes were taken both during the interview and they were complemented after each discussion.

In addition to the SSMP survey, a short questionnaire was prepared for the distribution sector in order to gain information about the demand of dairy products. Altogether twenty retail spots (15 small boutiques, three mini-markets and one supermarket) were randomly chosen in five districts of the city (three residential, two commercial). However, the discussions were kept very brief, between 10-20 minutes, as the distributors were very busy while working and hard to reach outside opening hours. The results were used to structure the value chain map and to triangulate data from the SSMP survey.

[7] The processors surveyed in Ouagadougou did not appear to seemingly differ from those in Bobo-Dioulasso, which is why including them in the final sample was not considered to create biases.

Interviews

Three types of interviews were conducted: semi-structured interviews as a part of case studies, key informant interviews and rapid semi-structured interviews in several occasions (see the list of interviewees in Appendix 2). In case studies, no fixed time was set for the interviews and the discussion flowed naturally around the set of questions until it was time for the interviewees to get back to work. These interviews investigated the history and current situation of the SSMP or SSMP as an employer, and they lasted between 30-90 minutes. The purpose was to shed light on the meaning behind the doings and sayings of the interviewees instead of focusing on what was explicitly said, which according to Kvale (1996) is at the heart of qualitative inquiry. To encourage openness and trust, the interviewees could decide where the interviews were conducted, in which language and at what time, with or without the presence of colleagues or family members.

Key informant interviews were conducted with public officials, researchers, key persons in producers' organizations and two semi-industrial dairies with the aim of retrieving background information of the context. The usual length was 1,5 hours. Shorter interviews included complementary interviews with SSMP survey respondents to clarify contradictory responses in the survey; rapid semi-structured interviews with 15 milk producers about their milk sales; and with eight milk powder wholesalers in Bobo-Dioulasso to gain an overview of trading activities; and five milk powder importers in Ouagadougou. The short length of these discussions (5-25 minutes) raises doubts about the data quality, as a good rapport with the interviewee is hard to create in such a short time. As a consequence, these data were interpreted with great caution and or were used to suggest paths for further research.

Participatory analysis

All survey respondents in Bobo-Dioulasso were visited a second time after a preliminary analysis of the survey responses. These results were presented with the help of a summary document (one version with mainly pictures, another with mainly text) and the informants were asked to comment them and give possible reasons for such findings. Discussions lasted between 20-50 minutes. There were three objectives behind this: firstly, it was a means to diffuse the results of the survey and provide the respondents with useful information about the SSMP sector[8]. Secondly, it served as a complementary data collection method and thirdly, as a participatory data analysis method.

Participatory approaches in research are used in order to generate better quality or more 'authentic' data but also for ethical reasons with the aim of handing a part of the researcher's power over to the subject of research (Nind, 2011, p.352). It must be acknowledged that the

[8] See section *Ethical considerations* p.21

approach in this study is far from a truly participant-led activity and is closer to consultation: the respondents were simply asked to comment on the results and no further analytical tools or exercises were given, and only some of these comments are explicitly presented in this study, while most were used as new data. This was due to limited time left for planning these visits, which was not sufficient for a more elaborated approach. In the famous typology of Arnstein (1969), this is seen as a hypocritical type of participation. Therefore, this should be mainly considered a data collection method that was *partially* used for participatory data analysis.

Workshop

During the fieldwork, it was found out that the government-led project PAPSA (presented in Chapter 3.1) is aiming at increasing local milk sourcing in SSMPs but with little success in Bobo-Dioulasso. This is why a joint workshop with the Ministry of Animal Resources (MRA) and CIRDES was organised in order to get current project stakeholders and possible future beneficiaries together to discuss the future of the project. The 6-hour workshop consisted of presentations and group work with the objective to assess the willingness of milk producers and processors to engage in the project, as well as their hopes and fears. Officers of the MRA facilitated group work discussions in the local language *dioula* and local university students took notes in French that were then collected for data analysis. See the program and participants of the workshop in Appendix 6.

Observation

The time spent in case study SSMPs involved constant observation. This was done in an unstructured manner, i.e. there were no predefined set of elements that would be observed (Bell & Waters, 2014, Ch. 12). Sometimes, this included participatory observation, namely helping the personnel with their daily tasks. Participating proved to be crucial to create and maintain a good rapport with the subjects of research. Especially making fool of oneself seemed to make the researcher more humane and less scary. Notes were taken during and after observation. The data were mainly used for triangulating other collected infomation. Observations were also documented during the survey and other interviews. As milk processing usually occurs at the entrepreneur's own house, this allowed seeing their living conditions, which provided some insight about their economic situation.

Informal discussions

Informal discussions proved especially important for understanding the consumption side, as no formal interviews were conducted with consumers. These discussions were usually not intentional but started casually in everyday life situations, often initiated by others than the

researcher. Therefore, these data may be more 'natural' and free from intentions, although might still have some 'social desirability bias' (Krosnick & Presser, 2010, pp.285-287). These impressions were not used for drawing conclusions but gave some perspectives on the areas of the value chain that were not formally investigated.

Access to information

Doing research in a foreign context can put limits on the access to information for instance due to cultural barriers (Leslie & Storey, 2003). Working with interpreters who are male, older and local helped overcome the biggest barriers a young, Western female researcher had to face. Their presence and introductions of the study project proved crucial in order to get positive responses to interview queries. Gaining confidence of the informants *during* the interview is not an easy task either, and undoubtedly some interviewees were less open than others. Creating a good rapport was easier in case studies, as the habit was to spend time at the processing unit as much as it seemed appropriate. Even when visible research action was not done, it was important to be present, observe and discuss everyday life topics with the employees, the head of units or their family members, which seemed to trigger more open discussions towards the end of the study weeks.

Ethical considerations

Multiple ethical issues arise when doing fieldwork, especially in the global South. According to Sheyvens et al., (2003, p.139): "*doing ethical research in a foreign setting [---] is about building mutually beneficial relationships with people you meet in the field and about acting in a sensitive and respectful manner*." This was ensured in several ways.

Firstly, talking about problems and upgrading possibilities with microentrepreneurs might give rise to negative feelings among the informants when they are reminded about their hardships. Therefore, the interviews were balanced between positive and negative topics and were always ended on a positive note. Secondly, the arrival of a foreign researcher was sometimes seen as a window of opportunity to get funding or other support. It was therefore important to make the objectives of the meeting clear before and during the interviews, in order not to create false hopes.

Thirdly, some informants suffered from projet/research fatigue after having participated in several research or development projects, however without seeing much outcomes. The workshop organized in collaboration with the MRA and CIRDES was one attempt to give back something concrete to the informants. The workshop allowed different stakeholders to get together, which many appreciated, and it gave the MRA both motivation and ideas on how to continue their development project. In addition, the results of the survey were given

and explained to all survey respondents in Bobo-Dioulasso, which provided (according to them) useful and interesting information about the SSMP sector.

Fourth ethical concern were case study participants, as the aim was to spend as much time with case SSMPs as possible to create mutual trust, which might provoke frustration. As no visiting hours were fixed, and the heads of units were usually too polite to ask to leave, it was necessary to remain constantly sensitive to non-verbal signs and to sometimes close the day even though the researcher's curiosity would have urged to stay. Lastly, an informed consent was assured, orally, before the interviews, and anonymity was promised to all informants.

2.5 Data analysis methods

Quantitative methods

The quantitative data were analysed through three steps: triangulation, computation into variables and statistical tests. First, quantifications provided by survey respondents were triangulated with qualitative data. This was an extremely important step to improve the quality of the data, since there were many contradictions. Respondents tended to overestimate for example their daily production and local milk sourcing volumes but these could be revised through triangulation[9]. Next, the resulting quantifications were computed into variables in Excel, e.g. total number of people employed by the SSMP or the percentage of local milk in total production. Also the quantifications of the milk value chain in Bobo-Dioulasso were calculated in this phase, namely the volume of milk powder processed annually, local milk processed annually, and value-addition along the chain.

Thirdly, SPSS was used to derive descriptive statistics of the survey respondents. Following this, barriers to entry were identified by testing if the two subsamples (the SSMPs who use local milk and those who do not) differ significantly from each other. For example, if education levels differ, it could be considered an entry barrier. Barriers to growth were tested only within the subsample who uses local milk. The amount of local milk processed annually (computed in step two) was tested against other variables. Again, if the difference of local milk use differed significantly for example between male or female-headed SSMPs, gender was considered a possible barrier for growth. The significance of the differences was tested with Fisher's exact test, SPSS Exact test for Pearson's Chi square, 2 independent samples *t*-test, Kruskal-Wallis test and Mann-Whitney U test, depending on the measured variable.

[9] For example one might first state they collect 50 litres every day, but after asking more, it appears milk suppliers come only twice a week, and that during the dry season they receive only 10 litres once a week, and actually this year they have not collected at all. By going through the entire interview one can construct a plausible estimation.

Four out of five significance tests applied are nonparametric methods. They can be used when the data do not meet the assumptions for parametric tests (Kraska-Miller, 2014, p.34). Nonparametric tests are suitable especially for small samples because fewer assumptions have to be fulfilled related to the variance of the responses (id., p.18). However, they are not considered as powerful as their parametric counterparts, which means they may not detect significant differences as well as parametric models (id., p.34). The only parametric test, 2 independent samples *t*-test, was used every time the data met all underlying assumptions and could thereby yield reliable results. See further description of each test in Appendix 3.

Qualitative methods

The qualitative analysis was done by using two techniques: 'categorization' and 'meaning interpretation' (Kvale, 1996, Ch.11). Data from case studies (interviews and observations), other interviews, as well as qualitative data from surveys were compiled together and were coded by labelling responses with meaning categories (e.g. Equipment problem; Training is important). Here, only explicit sayings were looked into without any 'hermeneutic suspicion' i.e. without considering whether what is said reflects the reality (ibid., p.203). Categories were created according to issues that emerge from the data, resulting in 31 categories used 486 times (see coding results in Appendix 4). This made it possible to detect how often certain themes were mentioned.

Kvale (1996) underlines that categorization requires compressing information and by doing this, it gets detached from its context. In contrast, meaning interpretation helps to 'recontextualize' (ibid., p.193) the utterances. Therefore, each important category was revisited code by code in the database to see who said them, in what kind of an interview, responding to what kind of a question and what else the same informant has said. This helped to reject some of the interpretations produced during coding and to seek for meanings behind what was explicitly said. Throughout the analysis, the derived analyses were both compared to interpretations proposed in the participatory analysis discussions and a field diary kept during the fieldwork period.

2.6 Limitations and biases

Two main limitations are apparent in this study. Firstly, the focus is strictly on the SSMP sector, and more specifically on the more established SSMPs. However, both local milk and milk powder are processed by many other, informal or formal actors. Their influence on the quantities of local milk and milk powder processed is unknown, as there are no prior quantitative studies investigating those actors. Secondly, the employment impact of local

milk sourcing was analysed only partially: by estimating the number of milk producing farms involved and by documenting the average salaries and the prevalence of part-time work at SSMPs. It would be important also to conduct a detailed survey among milk producers to see how many people are involved at each farm, what are the net profits of milk sales and how stable milk incomes are. Also on SSMP level, the stability of income could not be quantified. Salaries were a very sensitive issue for SSMP heads and employees even at case study SSMPs, despite a higher level of confidence gained during the case study weeks. Also indirect employment impacts were not considered, e.g. milk powder traders.

Moreover, three kinds of biases are worth highlighting. The fieldwork was done during the dry season, which often creates biases in development research (Chambers, 2008). During the dry season, there is less local milk available and the demand for refreshing dairy products is high. Because of the dry season bias, informants may tend to emphasize these aspects and also observations can only capture this reality, although the situation might be different during the rainy season. Secondly, the survey sample is small, which often made it impossible to use parametric significance tests. It might be that a larger dataset, and thereby the use of more powerful parametric tests, would have yielded more significant differences. Lastly, computing quantitative variables in survey analysis required a lot of triangulation and the resulting numbers should be treated at best possible estimations rather than absolute truths.

Nonetheless, these biases are illustrating the disclaimer made in Chapter 1.1: the findings of this study are constructed together by the informants and the researcher, reflecting the situation at one specific time and space, and under certain circumstances.

PART II

Literature review

Chapter 3.

Of milk and microbusiness – context and knowledge gaps

3.1 Milk processing in Burkina Faso

Milk production and consumption

Before depicting the state and evolution of the milk processing sector, it is necessary to understand the operating conditions in Burkina Faso. While the drylands in the Sahel are hardly appropriate for cultivation, the zone has an asset that differentiates it from many tropical areas: here, the bovine-ravaging tse tse fly is less frequent than in coastal West Africa and the land can, despite its dryness, serve as grazing land for livestock. In Burkina Faso, the contribution of the livestock sector to the economy is imposing. Keeping livestock creates 35 % of the agricultural GDP and livestock products (mainly living animals) compose around 14 % of the annual exports (MRA, 2011). Despite large number of cattle (9 million heads according to the MRA, 2015), milk production volumes are not as large as in some neighbouring countries[10]. According to national statistics, approximately 240 million litres of cow milk were produced in 2013 compared to approximately 500 million litres in Niger and Mali, who have relatively similar bovine headcount (FAOSTAT, 2017a; MASA, 2013, p.77[11]). Moreover, Dossa et al. (2015) find that only some 3 % of urban livestock producers in Bobo-Dioulasso consider milk their most important product. Such result is not surprising. Cattle provide a number of assets ranging from revenues from animal and meat sales to manure and social prestige, each important for livestock rearing households (Duteurtre & Faye, 2009). Milk is only one of them, although Duteurtre (2009) suggests in some cases milk can yield up to 80 % of the total revenues.

Traditionally in Burkina Faso, milk is produced and consumed by the *Fulani* people (Hamadou & Sanon, 2005). Outside the livestock rearing population, milk is not commonly

[10] This study focuses strictly on cow milk production, as goat milk is rarely commercialized or processed and other animals are usually not milked.

[11] For Burkina Faso, national statistics were used instead of those on FAOSTAT, as this was recommended by the partner organisations. The national statistics in 2013 provide two estimations of domestic cow milk production. The one used in this study (240 million litres) was chosen following the recommendation of the statistical department responsible for these estimations.

consumed by Burkinabes. Usually consumption is assumed to remain below 20kg ME/capita/year[12] but there is scarce evidence of how this varies between different population groups (Corniaux, 2013; Hamadou et al., 2007; Hamadou & Sanon, 2005; MRA, 2010b). In contrast, in Mali and Niger the average rate is assumed to be 60kg/capita/year (Duteurtre & Corniaux, 2013), and in the global North over 200kg/capita/year (Gerosa & Skoet, 2013). In a survey done in Bobo-Dioulasso, the vast majority of the respondents claim they consume dairy products less than twice per month (Hamadou et al., 2007). The only exception is yoghurt, which is consumed more often by most respondents, up to three times per week (ibid.).

Several factors can be pinpointed behind the low consumption levels in Burkina Faso. Dairy products are relatively expensive, as the average price reported by Hamadou et al. (2007) is around 400 F CFA/litre at the urban markets depending on products, i.e. 0,60 EUR. This is undeniably high in a country where more than a third of the population lives under the poverty line of 421 F CFA per day (World Bank, 2016a). For this reason, the consumption of dairy products is highly segmented in West Africa. The wealthiest population groups can consume pricey imported goods, such as UHT milk, while the urban masses have appetite for cheap milk powder sold in small quantities (Duteurtre, 2007). Another important issue is assumedly high lactose intolerance. De Vrese et al. (2001) suggest that as much as 70-90 % of African populations suffer from lactose malabsorption. One exception is the *Fulani* people, among whom lactose intolerance is estimated to be around 20 % (ibid.). *Fulanis* represent, however, only around a tenth of the total population in Burkina Faso (CIA, 2010), implying that the vast majority would be lactose intolerant to some extent. Although dairy *can* be consumed despite intolerance, and fermented products such as yoghurt are found to cause fewer symptoms (Weaver et al., 2013), these factors can undermine the possibilities to stimulate the demand for dairy products.

Evolution of the milk processing sector

In sub-Saharan Africa, only a fraction of milk is processed in dairies. Milk is mainly sold raw or processed by individuals, often by women who sell their produce at roadsides or at local markets (Duteurtre, 2007; Ndambi et al., 2007; Staal et. al, 2008a). The majority of milk is not sold at all (ibid.). Hamadou and Sanon (2005) estimate that in Burkina Faso on a national level, as much as 80 % of the milk is consumed on the farm. In contrast, a study done in Bobo-Dioulasso shows only around 20 % of the milk is reserved for household

[12] ME stands for milk equivalent, which is the volume of dairy products converted in liquid milk. In this study, the conversion rates established in Meyer & Duteurtre (1998) are used: 1 for liquid milk, cream and yoghurt, 7,6 for milk powder, 2 for condensed and evaporated milk, 6,6 for butter, 2 for fresh cheese, 4,4 for hard cheese. All import volumes presented in this study are converted into ME following these rates.

consumption (Hamadou et al., 2003)[13]. This underlines the differences in market orientation between rural and urban settings.

Corniaux et al. (2014) show that in the 1990s the Government of Burkina Faso, accompanied by international organizations, decided to unleash the country's dormant potential for more formal milk production. In a partnership with the FAO, the first state-led dairy was inaugurated in Bobo-Dioulasso, following the trendsetter countries Mali, Niger and Senegal who had done the same already in the 1960s and 1970s. Two more public dairies were opened in Burkina Faso in 1999 and 2001, which are still functioning, and still lie in the state's hands (id., pp.22-24)[14]. Unlike many other countries in West Africa, Burkina Faso has no industrial-scale dairies (ibid.)[15], nor are there any processing facilities of European dairies, such as Arla Foods or Nestlé who have local processing units for example in Senegal and Ghana, respectively (Orasmaa et al., 2016). Despite these particularities, a phenomenon sweeping the Sahel since the 1990s, 'minidairies', has strongly influenced the development of milk markets also in Burkina Faso.

According to Corniaux et al. (2014, p.27), 'minidairies', hereafter named small-scale milk processors (SSMP), arose in West Africa to fill the void left by public dairies, when many of them were forced to close down or were privatized. In Burkina Faso, interestingly, public dairies have sustained but the SSMP sector is still prospering. Corniaux et al. (id., p.38) identified some fifty SSMPs around the country in 2012, and the MRA registered 175 milk processing units in 2014 (MRA, 2015). The number of processing units followed by the MRA rose suddenly from 25 to 102 in 2006-2007, assumedly signifying changes in the accounting method but perhaps also demonstrating the expansion of SSMPs (ibid.). But Corniaux et al. (2014, pp.94-95) suggest that such non-industrial units can collect only a small share of the milk produced nationally. Indeed, in 2014, the MRA estimated some 3,6 million litres of cow milk were processed, accounting for less than 2 % of the total domestic milk production (MRA, 2015).

Undoubtedly, milk processing is not the easiest activity in the challenging conditions of the Sahel. SSMPs encounter a number of problems stemming from the seasonality of milk supply and low productivity of local milk producers, the incompatibility of tropical climate and unreliable cold chains, and a legion of other challenges commonplace for micro-

[13] This study was done when the state-owned dairy Faso Kossam was running in Bobo-Dioulasso, which created a stable marketing channel for milk producers, and may be one reason behind the high commercialization rate and thereby the low level of household consumption.
[14] In contrast, the first dairy was closed in 2005.
[15] The two remaining state-led dairies process 500-800 litres per day, i.e. they are semi-industrial according to the definitions set in Chapter 1.1

entrepreneurs in general (Corniaux et al., 2014; Ferrari, 2017)[16]. As milk powder is often less expensive than local raw milk and is available throughout the year, using milk powder has become an important part of many SSMPs' surviving strategies, and some SSMPs use exclusively milk powder without any fresh milk (ibid.).

There are some examples of successful attempts to increase local milk sourcing both among SSMPs and larger-scale processing units, driven for example by NGO-led interventions or processors' wish to supply niche markets (AVSF, 2015; Corniaux et al., 2012b). However, accurate quantifications of milk sourcing are often not available on the SSMP sector, which is one of the gaps this study seeks to fill. One exception is a project document of the French NGO Agronomes et Vétérinaires Sans Frontières (AVSF), arguing that local milk sourcing has increased from around 20 000 litres to 200 000 litres between 1996-2005 in Kolda, Senegal (AVSF, 2015). This is a result of continuous development interventions but implies that increase is indeed possible. With a more qualitative approach, Corniaux et al. (2014, pp.57-66) identify the key success factors for local milk sourcing, namely leadership skills, management of milk supplier relations, technical mastering of processing (e.g. hygiene), financial capacity and well-functioning commercialization.

Interestingly, Schneider et al. (2007) argue that the emergence of SSMPs has led to 'defeminization' of the milk value chain. Income from milk sales is traditionally women's income; they are in charge of milking and milk processing, although the man owns the animals (ibid.). However, SSMPs are a new economic activity, often ventured by men (Corniaux et al., 2014, pp.49-50). Hence, women have sometimes been deprived of their income source, as new entrepreneurs have taken over local milk markets (Fokou et al., 2011; Schneider, 2007).

Nonetheless, Corniaux et al. (2014) describe SSMPs overall as a welcome link between rural milk producers and urban consumers, allowing local milk consumption for also those households not neighbouring livestock farmers. Furthermore, they highlight the role of SSMPs in stimulating local economies and creating employment (ibid.).

Dairy sector policies – two policy orientations

In 1997, the Ministry of Animal Resources (MRA) was created to take the livestock sector in charge, underlining the importance of livestock production to the overall economy. A review of the key policy documents and budget allocations reveals that the current policies are slightly biased towards primary production, like improving cow races and veterinary services (GovBF, 2013; MRA, 2010b) This policy orientation does not mean, however, that milk

[16] Challenges in microentrepreneurship presented Chapter 3.3

processing would have been left completely aside: as mentioned, three public dairies have been established between 1991-2003. In 2012, the World Bank also inaugurated a cross-sectorial project PAPSA (Projet d'Amélioration de la Productivité et de la Sécurité Alimentaire), which became an important topic during the fieldwork for this study. One of the project's aims is to construct cooperative-run milk collection centres in urban zones, of which six in Bobo-Dioulasso (PAPSA, n.d.). Each centre would be connected with milk processing units that agree to buy the collected milk (ibid.). The review of the sector policies shows that PAPSA is the only on-going governmental development project that aims at increasing local milk sourcing in SSMPs instead of larger-scale dairies.

In 2010, the Government revealed an ambitious intervention program with a completely opposite strategy: establishing the first *industrial*-scale milk processing plants in Burkina Faso, one in Ouagadougou, one in Bobo-Dioulasso (APA, 2013). So far, only the unit planned in Ouagadougou, PDEL/ZPO (Projet de Développement de l'Elevage Laitier dans la Zone Périurbaine de Ouagadougou), is under implementation (PDEL/ZPO pers.comm.). PDEL/ZPO marks a throwback to the centralised, state-led policy orientation of the 1990s, as the dairy will be run by the Government, however this time in partnership with the milk producers' cooperative in Ouagadougou, COPROLAIT (MRA, n.d.). The current plan is to have a daily processing capacity of 30 000 litres of milk, mainly transformed into UHT milk (ibid.). This is an exceptional volume in West Africa where most large dairies collect less than 3000 litres of local milk per day (Corniaux et al., 2014, p.25).

In addition to sectorial policies, it is important to understand the influence of trade policies on the milk value chain. Being part of the ECOWAS (Economic Community of West African States), Burkina Faso applies the Common External Tariffs (CET) on imports from outside the region. Currently, the tariff rate for milk powder is 5 % *ad valorem*, and between 10-35 % for other dairy products (Duteurtre & Corniaux, 2013). The Economic Partnership Agreement (EPA) between the EU and ECOWAS will possibly remove the tariff on milk powder completely, although currently the resistance of two member states is stagnating the process (Business Day, 2017).

This liberal policy orientation has been condemned by many local and international NGOs, as it is believed to intensify the competition between imported and local dairy products, although it might benefit urban consumers by depressing prices[17]. However, this is nothing new. Already in the 1980s, governments of sub-Saharan Africa were said to "[*give] highest priority to urban consumer welfare*" with low dairy import tariff rates (von Massow, 1989, p.11).

[17] See Chapter 3.2 *Is importing harmful*? pp.32-33

Alongside the Government, many producers' organizations have an important role and there are many attempts to foster cooperation between actors within the value chain. Of the numerous producers' associations, COPROLAIT, UMPL/B and Interprofession de la filière lait are the most prominent[18]. While COPROLAIT is both an operator and beneficiary of the PDEL/ZPO dairy project, UMPL/B and Interprofession[19] responded to the new project fiercely, blaming the project for having ignored SSMPs:

"*We do not understand why artisanal dairies are disqualified without any analysis. [---] These dairies [SSMPs] are limited [in their capacity to supply the markets] but they have not reached these limits. Why not include them in the program and help them become productive?"* (Oudet, 2010).

Undeniably, both development strategies – one targeting SSMPs and the other aiming at industrialization – may have adverse impacts. The industrial dairy might take over the markets and thereby harm SSMPs. Due to the use of machinery, industrial processing might also create less employment than artisanal SSMPs. SSMPs, then again, may have too limited processing capacity to have notable development impacts. It would therefore be important to examine both strategies in detail in order to find out what kind of impacts each approach can generate. In this study, the focus will be on SSMPs, providing material for future comparison with the industrial strategy, once evidence of the latter is available.

3.2 The era of milk powder dependency

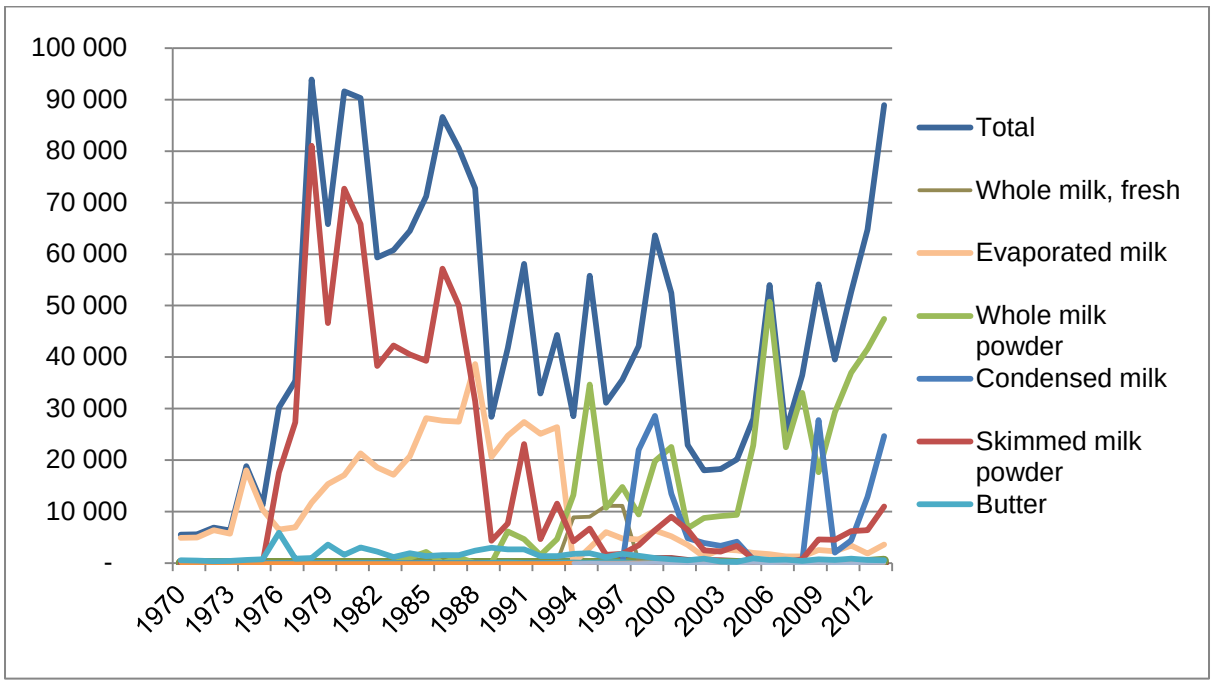
According to the FAO, Burkina Faso imported approximately 90 million litres ME of dairy products in 2013 (Figure 2), originating mainly from Ireland, the Netherlands and France (FAOSTAT, 2017c, 2017d). Although the imports are comprised of a multitude of goods, milk powders are indisputably reining the dairy trade. Therefore, this study focuses on milk powders instead of considering all imported products[20].

[18] The cooperative COPROLAIT gathers together over 700 milk producers around Ouagadougou and is partly running the new PDEL/ZPO dairy project in cooperation with the state (COPROLAIT, 2013). The national union of small dairies and milk producers in Burkina Faso (UMPL/B) has currently 48 small dairies as members from all regions of the country (UMPL/B, n.d.) and Interprofession de la filière lait connects value chain actors vertically, uniting milk producers, processors and distributors in one national organization.

[19] Interprofession was then named Table Filière Lait

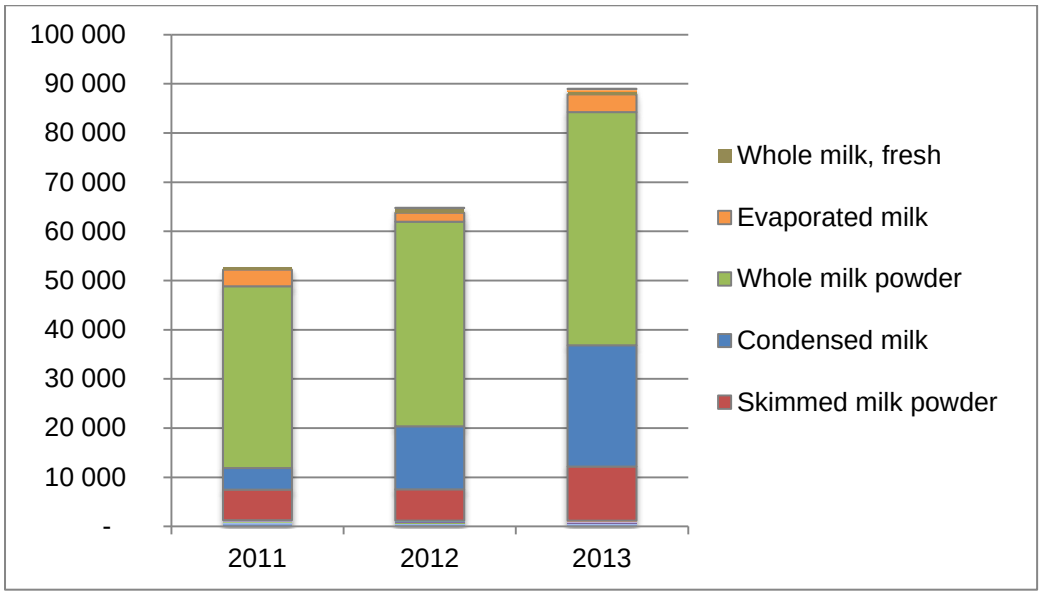
[20] Milk powders are divided in two main types: whole milk powder (WMP) and skimmed milk powder (SMP). Different variations, such as fat-filled milk powder (FFMP, where a part of the milk fat is collected for other uses and replaced with vegetable oils, such as palm oil) and baby-food mixtures, are also traded internationally. In this study, milk powder refers to whole, skimmed and fat-filled milk powders. Baby food is not included, as is the custom in the current literature.

Figure 2. Dairy imports to Burkina Faso 1970-2013 (tonnes ME)



Source: FAOSTAT, 2017c

Figure 3. Composition of dairy imports 2011-2013 (tonnes ME)



Source: FAOSTAT, 2017c

Milk powders accounted for more than 70 % of total imports in 2011-2013 (measured in volume, ME), the vast majority being whole milk powder (Figure 3). What these statistics do not reveal, however, are the imports of fat-filled milk powder (FFMP). FFMP does not have its own commodity code in trade statistics but is included in an aggregate category of 'Food preparations', where it is impossible to discern how much of it is FFMP. Thereby, statistics

might be underestimating the real extent of dairy imports. This study attempts to estimate the role of FFMPs in small-scale milk processing, providing insight of the fairly unknown phenomenon.

History of milk powder dependency

How did milk powder gain such a central role? Historically, milk has been traded across regions and continents for centuries in the form of butter and cheese. In the late 19th century, milk powder was invented, and it provided a new way of transforming milk into a less perishable good (Pinaud, 2014, Ch. 1). Pinaud (id., Ch. 2) notes that for many decades, it was mainly supplying the emerging Western food industry, e.g. industrial bakeries, or feeding cattle in the fodder-deficient Europe after the Second World War. When the European milk production skyrocketed in the 1980s, milk powder gained new strategic importance in the international trade. The unforeseen excess of milk could be processed into milk powder, stored and sold to growing markets in milk deficient regions (ibid.). Today, milk powder is also traded in a speculative manner to some degree, i.e. not always reflecting the actual demand at the market but following global prices (id., Ch.4).

Massive milk powder imports have become a general trend in West Africa. In leading milk producer countries Mali and Niger milk powder represents around 15 % of the assumed total dairy consumption (imports and domestic production together), whereas in coastal countries with weaker domestic production the proportion is around 50 % (e.g. in Benin and Togo), rising to up to 150-300 % in Ghana and Senegal, supposedly due to re-exporting (calculated based on FAOSTAT, 2017b, 2017c). In Burkina Faso, milk powder imports account for 15-20 % of the assumed annual dairy consumption (calculated based on FAOSTAT, 2017c and MASA, 2013, p.77). Like in Mali and Niger, a large livestock sector does not mean milk self-sufficiency. This is not a new situation. As illustrated in Figure 2, milk powder imports soared in the mid-1970s from nearly inexistent to 80 million litres ME and remained record-high until the late 1980s, today being around 60 million litres ME (see SMP and WMP together).

After having penetrated local dairy markets for five decades, it seems milk powder has become interwoven with the West African milk processing sector and deeply entrenched in the consumption habits of the urban population. Corniaux et al. (2014, pp.22-25) argue that milk powder was one of the founding factors behind the emergence of SSMPs across the Sahelian countries. It also gave rise to industrial-scale dairy processing in Mali, Senegal and Niger (ibid.). Pinaud (2014, Ch. 2) clarifies that following massive deliveries of milk powder as food aid, accompanied by awareness-raising campaigns and advertisement for European dairy products, imported goods slowly became a part of local consumption habits. Corniaux

et al. (2007) suggest that in many cities in West Africa, local milk products cover less than 10 % of the total consumption. This has been the case for decades (Le Troquer, 1993; von Massow, 1989). In Bobo-Dioulasso, local milk is assumed to account for roughly 8-12 % of the total consumption (Corniaux et al., 2007).

Corniaux et al. (2012a) conclude that milk powder will continue to play an important role in West Africa in the foreseeable future. They underline that making milk easily available for dairy processors would require, in addition to improvements in infrastructure, many fundamental changes in farming practices and social structures of a mass of smallholders. This is why they consider Sahelian countries, including Burkina Faso, structurally dependent on milk powder.

Is importing harmful?

For decades, increasing globalization of the world economy has provoked concerns of countries becoming more dependent on food imports, as it can in some cases render them vulnerable e.g. to changing world prices (Burnett & Murphy, 2014). In the 1970s, most of the world's countries were considered food self-sufficient (O'Hagan, 1976) but as intensive export-led cash cropping gained importance, most countries in sub-Saharan Africa shifted from net exporters of food to net importers (Rakotoarisoa et al., 2012). While high rates of import dependency can be considered reasonable for countries with less favourable environmental conditions (e.g. in North Africa) or with competitive export industries (e.g. Mauritius), it might become problematic for those having little capacity to export and to obtain foreign currencies (ibid.). Rakotoarisoa et al. (ibid.) note that importing food may create severe deficit in the trade balance and lead to food insecurity if domestic production is not developed in parallel to importing. Furthermore, some call for 'food sovereignty', shifting the focus from mere self-sufficiency to the idea that countries also need to have the power to *decide* how they feed their population (Burnett & Murphy, 2014).

In the case of the dairy sector, the central question is not about the ability to pay for imports. During the last years, dairy imports have accounted for only around 4-5 % of the total agricultural imports in Burkina Faso (FAOSTAT, 2017c). Instead, it seems it is the pervasiveness of imported goods at the domestic markets and their possible negative impact on local milk value chain that have given impetus for producers' organizations to mobilize themselves. In Burkina Faso, both local and international NGOs have voiced out their concerns of especially European milk flooding the local markets because of distorted market conditions (GRET, 2016; Oudet, 2005; PASMEP, n.d).

These reactions are not delimited to the civil society. Dairy import dependency is acknowledged in many of the key policy documents guiding the livestock sector, albeit the political discourse has drifted far from the fierce calls for self-sufficiency proclaimed by the revolutionary president Thomas Sankara in the 1980s (Harsch, 2014[21]). Today, the national program on rural development (PNSR), sets an ambitious goal of reducing dairy imports by at least 50 %, however without specifying a timeframe (MAH, 2012). In the national program on food security (PNSAN), the focus is more generally on curbing food imports without special attention to dairy products:

"*Food imports, evaluated being more than 12 % of the GDP in 2000, is one of the first causes of the structural deficiency in the country's trade balance. It is therefore urgent to change this tendency, not only in order to provide the population with sufficient, locally produced quality products but also to minimise the outflow of [foreign] currencies*." (MASA, 2014, p.16).

Although the dominance of milk powder might generate concerns, it must be acknowledged that it has also had positive effects. As mentioned above, milk powder has facilitated the rise of SSMPs and larger-scale dairy processing in West Africa. Furthermore, it provides urban consumers with affordable dairy products when fresh milk-based ones are not available (Corniaux et al., 2007). For example a policy simulation study in Senegal suggests that high dairy import taxation would hurt domestic consumers if not done in parallel with heavy subsidization of local processors, underlining the importance of imports for consumers (Diarra et al., 2013).

Reducing import dependency – limits of the available literature

Although many countries in sub-Saharan Africa have a strong tradition in livestock production, dairy imports are widespread across the continent. Examples of countries where dairy imports would have sustainably fallen are hard to find. According to FAOSTAT (2017b, 2017c), South Africa has for decades been the continent's number one producer and exporter of dairy products. Recently, only Kenya and Uganda have managed to create new dairy export industries alongside South Africa, while other countries are clearly net-importers (ibid.). Some European NGOs attribute the success of Kenya and Uganda to trade protection measures, specifically to the import tariff of 60 % introduced in 2002 for dairy products from outside the East African Community (Fritz, 2011, pp.66-67). However, in

[21] Self-sufficiency was one of the main policy objectives of president Sankara. One of his famous initiatives was to make it mandatory for public officials to wear locally produced, woven and sewn clothes (*Faso dan Fani*) in public events, and he also urged breweries to use local sorghum and bakeries to use corn flour instead of imported wheat (Harsch, 2014, Ch. 6 State and the market).

Uganda milk powder imports started to fall already in the 1990s and in Kenya, imports have actually increased markedly over the 2000s (FAOSTAT, 2017c).

While plenty of studies have been done on improving primary production in sub-Saharan Africa, milk powder imports – for examples the drivers behind rising imports in Kenya or reasons for the decrease in Uganda – are hardly researched. In particular, the interplay of milk powder imports and domestic production and processing, or different policy measures, has not been thoroughly documented. A few exceptions exist: von Massow (1989) suggests that high dairy imports in the 1980s in Mali and Nigeria were amplified by overvalued local currencies and Pinaud (2014, Ch. 2) traces the history of milk powder imports to the mixed objectives of the European countries to provide, on one hand, their colonies with hygienic and affordable milk powder for humanitarian reasons, and on the other hand, to ship excess milk to new markets in the search of economic benefits. The policy simulation by Diarra et al. (2013) argues that taxation on dairy imports accompanied with subsidies to local dairy processors can increase local milk sourcing, however without analysing how this would affect imports.

By and large, the drivers of dairy imports, and thereby the possibly ways to decrease them, are yet to be uncovered. This study aims at discovering in particular to what extent SSMPs could influence milk powder imports, which has assumedly not been investigated so far. Some statistics estimate the use of *local* milk in SSMPs but give no insights on how much milk powder they absorb, or the possibilities to replace the used powder – all topics analysed in this study.

3.3 Growth and employment generation in MSEs

Research on employment – how and why?

Besides the impacts on imports, this study investigates possibilities to create employment through local milk sourcing. In sub-Saharan Africa, the lack of employment is one of the prevailing reasons for poverty and creating employment opportunities has become a key policy objective also in Burkina Faso (GovBF, 2015). In 2014, the official unemployment rate was 6,6 %, with women (9,3 %) and youth (around 8 %) being more touched than other population groups (ibid.). However, unemployment statistics capture mainly those who are privileged enough to stay formally unemployed for a certain period, as the vast majority has to do some work, anything, to survive (Dewan & Peek, 2007; Fox et al. 2016). Instead of focusing on binary employment/unemployment categories, it is crucial to consider also the *quality* of work. Quality can be measured for instance in terms of income level and income stability (Dewan & Peek, 2007), which will be considered also in this study.

Assessing the quality of employment also involves inequality: who gets employed and for what wages? In sub-Saharan Africa, women report higher un- and underemployment levels, lower wages, seem to have less options for income generation activities and can be discouraged to even search for work outside the household (Calvès & Schoumaker, 2004; Dewan & Peek, 2007; Fox et al., 2016). Creating work for women is therefore of utmost importance. Another target group of a plenitude of research and governmental employment programs are youth. Also the geography of employment is worth considering. Rural zones in sub-Saharan Africa have in general fewer options for wage employment, and poverty rates are higher than in urban areas (World Bank, 2016a). Thereby, urban centres have a big role in creating markets and processing facilities for products from adjacent rural zones. Fostering local value chains is one approach to this end.

MSEs, growth and employment

As of today, the research on the economy of SSMPs is fairly scant. Therefore, before turning to the studies on growth and employment among SSMPs in particular, the literature on micro-and small enterprises (MSE) in general is reviewed to provide further background.

Microenterprises represent the majority of private businesses in sub-Saharan Africa and their contribution to the economy is commonly acknowledged (e.g. Frese & de Kruif, 2000). However, their capacity to employ other people appears to be limited. Comprehensive surveys conducted in sub-Saharan Africa by Mead and Liedholm (Mead, 1994; Mead & Liedholm, 1998) found that within a timespan of ten years, only about a quarter of microenterprises increased the number of workers above four, and as little as 1 % grew above the threshold of ten employees to become small enterprises. Most firms did not grow at all (ibid).

For the purpose of this study, it is essential to understand what are the barriers to entry and growth for MSEs. Literature on barriers to entry in the MSE sector is scarce, but the general conception is that these activities have low start-up costs and due to informality, also institutional barriers are not very important (Roy & Wheeler, 2006). Also entrepreneurial motivation is considered an important determinant of who chooses to become an entrepreneur, although some are pushed to entrepreneurship in the lack of other options (Berner et al., 2012).

A much larger body of literature is available on barriers to growth. MSEs in the global South are found to encounter context-related challenges ranging from weak macroeconomic conditions and limited access to credit to lack of technology and poor infrastructure (e.g. Grimm et al., 2012; Nichter & Goldmark, 2009). Several studies underline the internal characteristics of the entrepreneur. Frese and de Kruif (2000) stress that microbusinesses

are highly influenced by the personal characteristics of the entrepreneurs themselves, which is why more research should address psychological aspects of the microbusiness owners. Some emphasize the influence of entrepreneurial ambition as the determinant of growth (e.g. Berner et al., 2012; de Mel et al., 2010). Roy and Wheeler (2006) find that in urban West Africa, most microentrepreneurs are survival entrepreneurs, which means, as highlighted in Chapter 1.4, that their ambition to grow is low because they concentrate on gathering daily income rather than developing their business. Others focus on human capital and management skills (e.g. Hamper-Milagrosa et al., 2015; Ligthelm, 2010). However, measuring entrepreneurship skills and thereby the potential to overcome challenges can run into problems of arbitrary indicators. Therefore, such skills will not be investigated in this study.

Many studies also investigate whether gender is correlated with MSE growth but the evidence is controversial. The literature review by Nichter and Goldmark (2009) suggests that MSEs led by women grow less, a common explanation being that women show more risk-averse behaviour, as they want to ensure a sufficient income for their families and concentrate on income diversification instead of growth. Also the burden of domestic tasks might play a role (Mead & Liedholm, 1998s). In some other studies, gender has either no impact on MSE success, or the result is mixed (Hampel-Milagrosa et al., 2015; McPherson, 1996). Lastly, Nichter and Goldmark (2009) point out the crucial role of social networks especially in challenging business environments. They can for example provide favourable financing solutions or reduce transaction costs and thereby trigger business development.

Despite the abundance of research on MSE growth, no clear patterns emerge about the most important factors for upgrading, and silver bullets for transition from microbusinesses to small firms, or beyond, are yet to be found. This is why also researching the 'potential' of SSMPs becomes challenging. The literature clearly does not agree on what the building blocks of potential are. What it does agree upon is that most MSEs would need assistance in order to upgrade. Berner et al. (2012) remind that especially survival entrepreneurs need support in all levels from microcredits to macroeconomic improvements. Many studies also insist on the different needs of survivals and growth-oriented entrepreneurs (Berner et al., 2012; Mead & Liedholm, 1998; Nichter & Goldman, 2009; Verrest, 2013). They underline that one-size-fits-all interventions aiming at both poverty alleviation among survivalists and spurring growth among other entrepreneurs are rarely successful.

Employment generation in SSMPs – scant evidence

Employment generated by SSMPs has so far been subject to little research. Case studies conducted by Corniaux et al. (2014) find that SSMPs employ on average 8,7 people

(calculated based on pp.101-102), which is remarkable when juxtaposed with the rather weak performance of MSEs in general as employment creators. When compared to the amount of milk collected, they employ on average 3,4 people per 100 litres of milk collected during the high season, and 8 people/100 litres when production is low (ibid.). This, however, does not concern employment created in primary production. These case studies claim that SSMPs have a network of milk suppliers varying from 12 to 260 producers but the mere size of the supplier network tells us little about how many producers gain a regular income from one SSMP. How many of them supply the SSMP regularly and how many days per week or year? If an SSMP is connected to more than a hundred producers but collects only 50 litres per day, it is likely that all producers do not deliver milk every day. In this study, milk sourcing patterns will be investigated in more detail in order to evaluate trustworthily how many producers actually can be included in the employment estimations.
Some comparison is provided by the International Livestock Research Institute that suggest that in Kenya and India, milk processing and marketing creates between 1,3-1,8 jobs per 100 litres processed (Staal et al., 2008a, 2008b). Their estimation of livestock farmers employed ranges from 7,3 to 23 people per 100 litres raw milk produced, the majority being family labour. On-farm job might therefore have a significant contribution on the overall employment impact. However, it must be acknowledged that integrating producers in the milk value chain does not necessarily lead to poverty alleviation. Marginalised producers are often unable to participate in and gain income from more developed value chains (Altenburg, 2006) and according to the literature, dairy value chain seems to be no exception (e.g. Corniaux et al., 2005; Dieye et al. 2003; Ogutu et al., 2014).

Employment impacts are very little documented also in industrial dairy processing. In the case studies by Corniaux et al. (2014), the three surveyed industrial[22] dairies employ 1-14 people per 100 litres collected depending on season, however only 2-3 people on average (calculated based on p.103). This parallels the employment created by SSMPs and therefore goes slightly against intuition, according to which industrial and more mechanized systems would be less labour intensive than SSMPs.

While this part contextualized the study and identified some important knowledge gaps, the following chapters will aim at filling these gaps in thematic chapters, of which the first will present the SSMP sector and the dairy value chain in Bobo-Dioulasso in more detail.

[22] One of the dairies would be more appropriately be called semi-industrial due to low production levels, 500-900 litres/day.

PART III

Findings and discussion

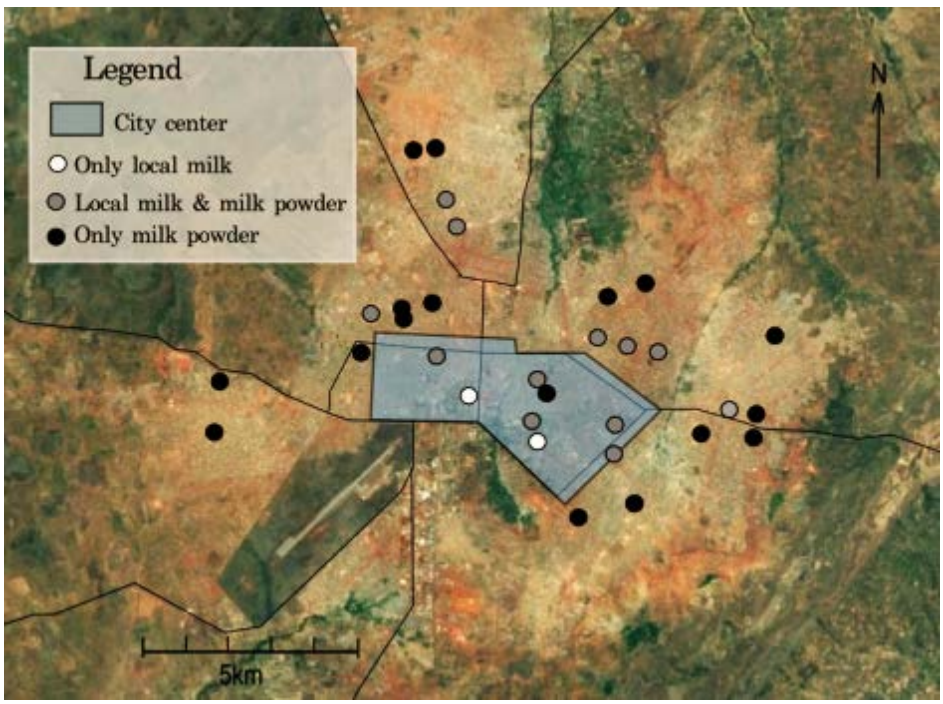
Chapter 4. Small-scale milk processing – Characteristics and the local dairy value chain

4.1 Who are the small-scale milk processors?

The first analysis chapter will uncover the contribution of SSMPs to local milk value chain in Bobo-Dioulasso today. Before this, the descriptive statistics of the sampled SSMPs (Map 2) will be briefly presented, as well as the three case studies.

Map 2. Surveyed SSMPs in Bobo-Dioulasso

NB. The map does not include the three SSMPs excluded from the final sample



Source: Adapted from Google Earth (2017)

Descriptive statistics

The characteristics of the surveyed 39 SSMPs are summarized in Table 4. The majority of units has been founded in the latter part of the 2000s and is headed by men. The use of milk

powder is widespread, daily production levels are low and equipment is mainly artisanal. Overall, the SSMPs seem to be largely following the characteristics of 'minidairies' depicted by Corniaux et al. (2014, pp.34-35). On the contrary, they are mainly private enterprises and none is initiated by NGOs or the public sector, whereas Corniaux et al. (id., p.3) emphasize that often SSMPs are initiated by development interventions. In other aspects, the SSMPs resemble microbusinesses in general, e.g. showing low education levels of the heads of units and weak access to credit. However, the average investment costs when starting milk processing are noteworthy: the average of 977 000 F CFA is some thirty times the monthly minimum salary[23]. This provides some new insight on start-up costs of microbusinesses, which usually are considered low (Roy & Wheeler, 2006).

Case studies

The descriptive statistics presented above can only give a hint of the nature of SSMPs in Burkina Faso, which is why case studies become helpful. This approach yielded a deeper analysis of the processing units, taking into account for example the personal life situations and the background of the head of unit, instead of merely looking at indicators of the current performance. Key features of the three cases are presented in Table 3. More than that, this section brings the statistics into life by briefly describing who the heads of SSMPs are.

Table 3. Descriptive statistics of case study SSMPs

SSMP	Personnel (n. people) **[1]**	Average total production (l ME/day) **[2]**	Annual production (l ME/year)	Local milk in total production	Producers and collectors associated (n. people) **[3]**	Average gross sales (F CFA/day)
Case A	3	40	5 600	0 %	0	No data
Case B	4	60	16 800	40 %	10	5 000
Case C	23	590	194 000	14 %	34	500 000

Source: SSMP survey and case study interviews
1 Personnel whose salary is paid by the SSMP. E.g. external delivery services not included. Heads of SSMPs are included
2 NB. Not necessarily produced every day
3 Milk producers and collectors who deliver milk regularly to the SSMP.

[23] The official minimum salary is 32 218 F CFA/month (Bureau of Democrary, Human Rights and Labour, 2016)

Table 4. Descriptive statistics – Background, production and economy

	n	Mean	SD	Min	Max
Founded in (year)	**39**	2008	5,9	1998	2016

Local milk processing	**39**	Education	**35**
Yes	22	None	6
No	17	Primary	14
Gender (head of SSMP)	**39**	Secondary	8
		High school	5
Female	11	Tertiary	2
Male	28		
Status	**39**	Training **[1]**	**38**
Private individual	38	None	7
Private collective	1	Informal	11
Public/NGO	0	Formal	20

	n	Mean	SD	Median	Min	Max
Production (litres ME/day)	**39**	260	294,06	150	40	1 250
Local milk processed, dry season (litres/day)	**22**	92	94,02	65	0	300
Local milk processed, rainy season (litres/day)	**22**	125	119,12	100	20	500
Local milk (%) in annual production	**22**	49,1	37,02	44,44	5	100
Equipment **[2]**	**39**					
Artisanal	27					
Machines	12					
	n	Mean	SD	Median	Min	Max
Start-up investments (F CFA) **[3]**	**32**	976 547	108 707	590 000	250 000	4 500 000
Clients (n. clients) **[4]**	**31**	73,6	99,8	30,0	1	450
	n	Yes	No			
Credit	**37**	7	30			
Main income **[5]**	**33**	29	4			
Other income	**38**	14	24			
Pays taxes	**27**	14	13			

1 Training in milk processing
2 Machines refer to having a heater for pasteurizing large quantities of milk (200-500 litres), and/or automatic packaging machines
3 Investment costs when starting the SSMP
4 Number of retail shops, restaurants and schools that regularly buy the SSMP's products
5 Milk processing is the SSMP head's main income

Source: SSMP survey

Case A

A 35-year-old man with a wife and one child live in a tiny three-room rental apartment. In the narrow corner room, his wife prepares a powder-based yoghurt mix[24]. Preparation takes only 30 minutes, after which the yoghurt is left in a covered plastic barrel for fermentation. The man employs one external person, a woman from the neighbour, who helps to wash the yoghurt pots. This week they could sell almost all they produced but they have come way down from what they processed earlier, which was some 160 litres per day.

"*It may take 2-3 weeks without any processing. The markets have been slowing down, the competition is hard. [---] Sometimes there are big orders but I cannot always respond to them. It is hard to find the money to buy the milk powder, sugar and pots to prepare big amounts at once, so I have to say no to big clients."*

They used to employ up to eight people and they have even tried to process local fresh milk for three months some years ago. However, local milk processing was stopped because their only milk supplier passed away and they did not find a new one.

Case B

Seven days a week, a 40-year-old man is working nearly around the clock. During the dry season, he processes 40 litres of powder-based yoghurt or *dégué*[25] per day and if possible, he buys some fresh milk that he transforms into yoghurt. He would only use local milk if he could, and he tells passionately about its good qualities. He insists on pasteurizing everything, even when using milk powder. Heating up and cooling down 20 litres of yoghurt mix takes some 3-4 hours, instead of 30 minutes without pasteurization, as in Case A.

"*I started to make yoghurt because I need to feed my family. Because I need money, I can only make high quality. That is why I pasteurize, and I also use local milk always when I can. But when it is hard to find [local milk], I have to use powder*. [---] *But for me processing local milk is easy because I love my work."*

As in Case A, production quantities have fallen. Three years ago he produced 120 litres per day and employed 10 people. Today, local milk is used mainly during the rainy season, primarily for yoghurt, but it allows processing special products especially during the rainy season. He collects the milk fat after pasteurization to produce liquid butter that is highly demanded by women for cosmetics, and sometimes he makes cream cheese for sale or for the family.

[24] Local yoghurt is technically sweet fermented milk, as it does not contain the bacteria *Streptococcus thermophilus* and *Lactobacillus bulgaricus* required for a product to be called yoghurt.

[25] *Dégué* is local yoghurt mixed with cooked millet or couscous.

Case C

A courtyard inside of an impressive two-floor house is busy with some fifteen processing workers running around thirteen freezers, a 300-litre pasteurizer and an automatic packaging machine. While Case B uses 3-4 hours for preparing 20 litres of yoghurt, the pasteurizer heats 300 litres in the same time. Within 12 years, a 50-year-old woman has created a firm that has financed the university studies of their three children abroad. The personnel is wearing a full working outfit with their mouths covered, a new certificate from a public health agency is hanging on the wall and a secretary is updating the daily sales on Excel.

As in Case B, their main product is powder-based yoghurt but they also process fresh milk every day of the year. The head of unit is worried about the costs of local milk but wants to continue processing it, as their firm is known for that.

"*If we pay the milk 450 F/litre [during the dry season] and then sell it for 550 F/litre after pasteurization and packing, where is the profit? I prefer fresh milk but it's not that profitable. And there is not enough milk available. That is why at the moment we add milk powder also in liquid milk. Otherwise we cannot make it."*

These cases will be used for further analysis in the reminder of the study.

4.2 Dairy value chain in Bobo-Dioulasso

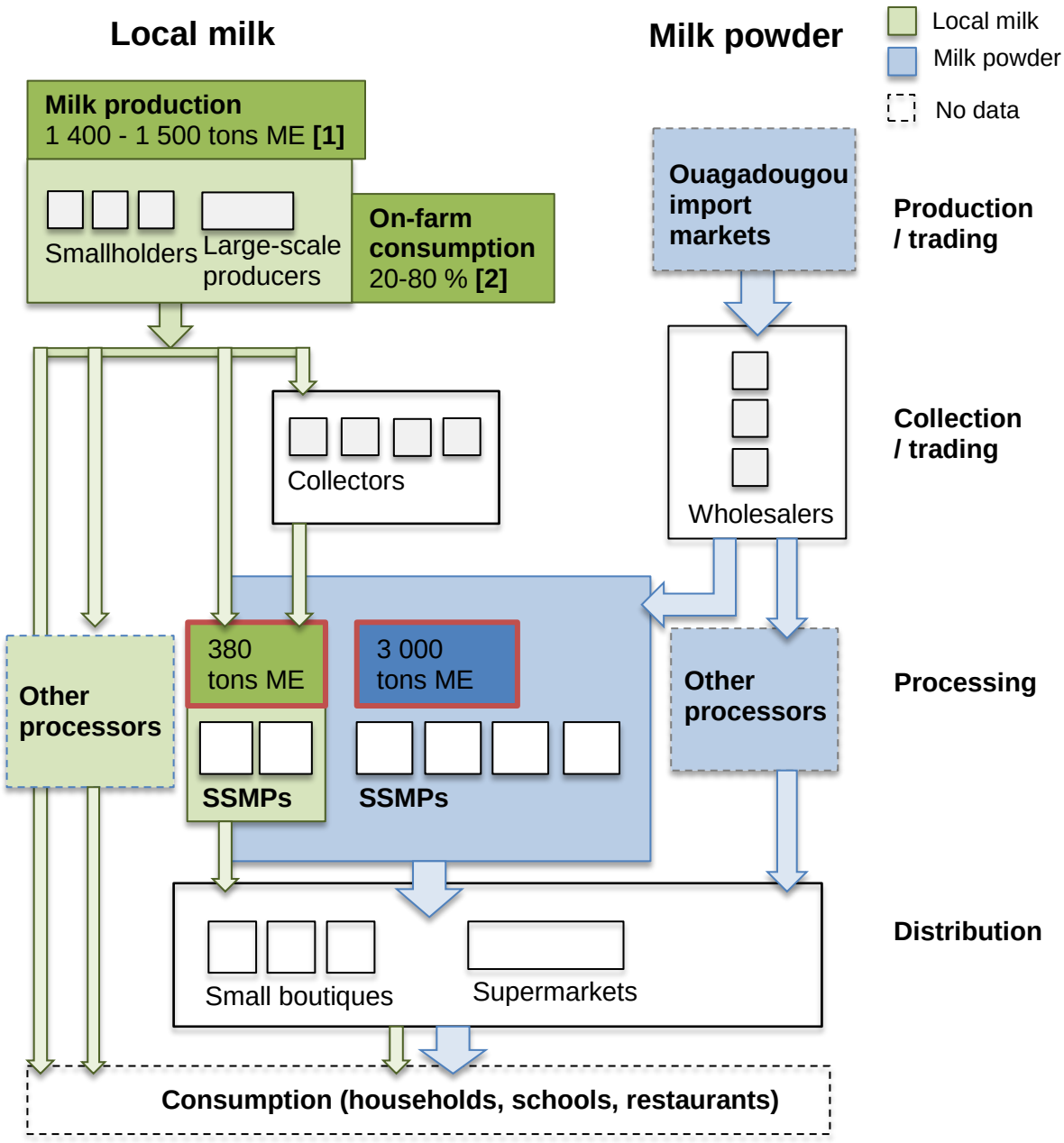
This section quantifies how much local milk and milk powder SSMPs use today and describes some key aspects the dairy value chain in Bobo-Dioulasso. This will be important when turning to analyse upgrading potential in Chapter 5. The findings presented in this section (4.2) are strictly focusing on dairy value chain in Bobo-Dioulasso, i.e. the eight SSMPs surveyed in Ouagadougou are excluded from the analysis.

Dairy markets and local milk in Bobo-Dioulasso

Figure 4 represents the dairy value chain in Bobo-Dioulasso, with the red circled boxes presenting the findings of the SSMP survey, while other quantifications are derived from the literature or remain unknown. Following first the flow of local milk (green colour), it is important to note the uncertainty of the volume of milk available in the markets of Bobo-Dioulasso. The literature review showed that around 1 400 - 1 500 tonnes of cow milk is

produced around the city per year mainly by smallholder farmers, but the share of household consumption can range between 20 - 80 %[26].

Figure 4. Milk value chain in Bobo-Dioulasso



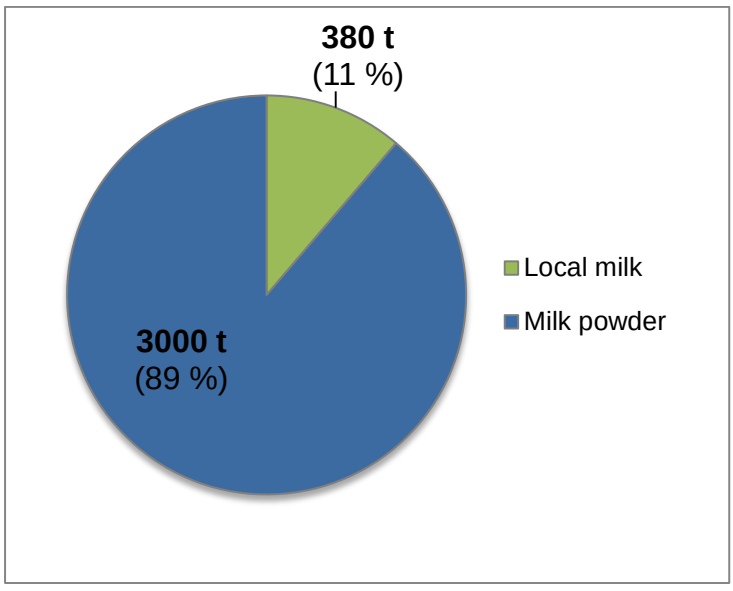
Source: SSMP survey, distribution survey, interviews with milk powder importers
1 Hamadou et al. (2003)
2 Hamadou et al. (2003); Hamadou & Sanon, 2005

[26] See Chapter 2.3 p.15 and 3.1 p.25

At livestock farms, milk can be sold to milk collectors, SSMPs, consumers, or to other small processors, for example to a neighbour that pasteurizes milk at home and sells it at the village market (Hamadou & Sanon, 2005). Informal discussions with consumers reveal that during the dry season, dairy products are mainly purchased at small boutiques for household consumption or are consumed at cafés. During the rainy season, some street vendors start circulating around the town, selling either raw or pasteurized milk, yoghurt or *dégué.* Observations during the fieldwork showed that supermarkets are rare and accessible only to wealthier households.

Milk powder (blue colour), then again, reaches Bobo-Dioulasso after a long journey. It is imported both in bulk in 25kg bags, or already refined, primarily in small bags of 12-25 grams or jars of 500 grams. Interviews with five milk powder importers in Ouagadougou suggest that importers range from self-employed businessmen to medium-sized trader companies up to multinational corporations. Overall, importers seem to be operating behind closed doors and all interviewees claimed they do not know their own market share or who their competitors are. After crossing the national borders, milk powder was said to be sold and resold to a chain of wholesalers, being finally purchased by SSMPs or other processors and distributors (boutiques, cafés, sometimes individuals) in Bobo-Dioulasso.

Figure 5. Primary material used in SSMPs of Bobo-Dioulasso (tonnes ME)



Source: SSMP survey

In the city of Bobo-Dioulasso, altogether 50 active milk processors were identified with the chosen sampling strategy. In the SSMPs, the predominance of milk powder is indisputable. Of the identified 50 processors, only two process exclusively fresh milk and 36 use only milk powder, while the remaining 12 SSMPs use both powdered and fresh milk (Map 2). Also processed quantities speak for themselves: the survey results suggest around 3 000 tons ME of milk powder are processed annually in the city, compared to some 380 tons ME of local milk[27] (red boxes in Figure 4). This means only around 11 % of the annual dairy production in SSMPs would be based on local milk (Figure 5).

Interestingly, the survey suggests about a half of the milk powder used in SSMPs is fat-filled milk powder. This is a noteworthy finding, as fat-filled milk powder is excluded in official milk powder import statistics[28]. The statistics presented by the FAO are thereby surely underestimating the real volumes of milk powder imported in Burkina Faso.

According to the current estimation of the total raw milk production around Bobo-Dioulasso, SSMPs use approximately a quarter of the milk produced around the city. This is a surprisingly high share, as the national average of milk processed in dairies is less than 2 %[29]. If household consumption was only 20 %, there would be as much as 1 200 tonnes available for commercialization, which is enough to triple the current processing volume. Naturally, the more households need for their own consumption, the less room there is for expanding the processed quantities.

At the consumer side, the distributor survey showed the demand for liquid local milk is very limited. However, consumer preferences are dynamic and can change. The demand especially for yoghurt has increased markedly: whereas in 2007, there were only seven SSMPs in Bobo-Dioulasso, in 2017 there are at least 50, and yoghurt is the main article for nearly everyone. The markets have successfully absorbed this growing supply. Today, yoghurts produced in SSMPs (fresh- or milk powder based) have become by far the most consumed dairy product according to the distributor survey. These pieces of evidence suggest that both the production and consumption ends of the value chain offer possibilities for expanding local milk sourcing. The question that will be investigated further is how potential SSMPs are to take advantage of these possibilities.

[27] In the final sample, 31 SSMPs are located in Bobo-Dioulasso. The survey suggests they process 2100 tonnes ME of milk powder and 370 tonnes ME fresh milk per year. The remaining 19 SSMPs (of the total number of 50 SSMPs in Bobo-Dioulasso) were given the median production levels to obtain the total processed quantities, 3 000 tonnes ME for milk powder and 380 tonnes ME for fresh milk.
[28] See Chapter 3.2 pp.30-31
[29] See Chapter 3.1 p.26

Value-addition

When processed into yoghurt, the most consumed article today, the value of raw milk rises two- to six-fold (Table 5), depending on the season and overall production costs. Because consumer or retailer prices were found to remain the same regardless of seasons, the profit margins of boutiques are rather fixed. Overall, boutique owners appear to gain a relatively high profit margin per litre. In contrast, SSMPs have to endure remarkable variation of profits. In particular when using local milk, their margins are clearly lower during the dry season – around 8 months per year. Raw milk use can yield similar profits than milk powder but it seems this concerns only the rainy season and only yoghurt processing.

Table 5. Value-addition in yoghurt production (F CFA/litre ME)

Value-addition from raw milk to ready yoghurt (200ml bag). White rows show the costs, blue rows the profits accrued to each actor. Values marked with Case B/C represent only those cases, others are averages from the entire data.

		Local milk (yoghurt 200ml)		Milk powder (yoghurt 200ml)	
		Dry season	Rainy season	Dry season	Rainy season
Milk producers	Milk production costs	No data	No data	-	-
	Profit margin	No data	No data	-	-
Milk collectors	Milk price	Case B: 400-450 Case C: 300-400	Case B: 300< Case C: 200-350	-	-
	Profit margin	50-100	50-100	-	-
SSMP	Total production costs **[1]**	B: 690 C: 630	B: 540 C: 500	B: 485-525 C: 500	B: 485-525 C: 500
	Milk price **[2]**	300-600	250-500	200-250	200-250
	Profit margin	B: 60 C: 120	B: 210 C: 250	B: 225-265 C: 250	B: 225-265 C: 250
Boutiques	Buy in-price	750	750	750	750
	Profit margin	250	250	250	250
Consumers	Consumer price	1000	1000	1000	1000

Source: Distributor survey, SSMP survey and case studies.

1 Total production costs include: raw milk/milk powder, sugar, ferment, water, packaging, salaries, gas, electricity, distribution costs, and in Case B the rent of the workspace.
2 The range of prices all surveyed SSMPs pay for raw milk or milk powder per litre (included in total costs above).

The situation is different for liquid pasteurized milk (compared to yoghurt), which is the most common fresh milk-based product in SSMPs[30]. All surveyed SSMPs stated pasteurized milk is sold to distributors at 550 F/litre. Strikingly, production costs of pasteurized milk were as much as 450-600 F/litre in the two case units depending on season. Thus, liquid milk yields very little profit and is sometimes produced without covering the costs. The fundamental problem is that when raw milk prices fall, so does the demand for dairy products. Distributors and SSMPs revealed that consumers do not wish to consume refrigerated yoghurt and milk when temperatures drop during the rainy season. So, when profit margins would be higher, demand falls. The low and fluctuating profits are one of the major economic challenges the SSMPs encounter, and will be further analysed in Chapter 5.

Motivation for local milk sourcing

In order to analyse the potential to source more local milk, it is helpful to briefly outline why SSMPs use very little local milk today and how are their attitudes towards using more, or starting to use it, in the future. Roughly four types of SSMPs were identified in this regard.

Firstly, one group of processors (n=7) sources already a lot of local milk (more than 50 % of total production) and they are planning to use more in the future. In the interviews, it became clear that for them local milk sourcing is part of their business strategy. They insist on the high demand for local milk and are rather reluctant to use milk powder as a replacement. Another type (n=7) uses remarkable amounts of local milk (many use more than half of the production) but are not motivated to increase the volumes. This was either due to hardships in personal life, implying they might be survival-type of entrepreneurs, or it simply reflects their management strategy:

"*No, [local] milk today is not sufficient [during the dry season]. But I cannot take any more [local milk] suppliers in because then I would have too much during the rainy season. I prefer to manage well the quantities I get."* (SSMP survey, Local milk processor)

The third type of SSMPs (n=8) is growth-oriented but mainly in terms of milk powder processing. Many wish to expand their business but do not consider local milk a tempting option, as they aim at large production quantities for low cost.

Lastly, a large part of the units (n=17) operates on a very small scale and uses only little or no local milk (20 % of total production or less). In the interviews, many of them appear to be risk averse, reflecting the characteristics of survival entrepreneurs presented in the theory

[30] According to the SSMP and distributor surveys, yoghurt is by far the most consumed dairy product but when considering only local milk processing, pasteurized liquid milk becomes the most processed article (see Chapter 7.1).

chapter. This will be another core element further highlighted in Chapter 5. Overall, many of them do not have visions of expanding their business, be that employing new people or upgrading in terms of local milk sourcing. Interestingly, some of these units do plan to start or increase local milk sourcing and to develop their enterprise. They aspire growth and are willing to take risks even though today their business resembles a survival-kind of activity. This goes against the binary classification of survivals and growth-oriented MSEs of Berner et al. (2012).

While this chapter depicted the current situation of the SSMP sector, ‘actuality’ in Aristotelian terms, the primary aim of this study is to uncover the ‘potentiality’. Could more SSMPs possibly become interested in local milk sourcing and also succeed in it? This will be analysed in the next chapter.

Chapter 5.

Potential to upgrade

Chapter 4 revealed how marginal role local milk currently has in small-scale milk processing compared to milk powder and noted that many SSMPs are not interested in starting or increasing local milk sourcing. Could the situation be different in the future? As noted in the theory part, the concept of potential is highly abstract and measuring something innate, perhaps non-observable, is extremely challenging. Here, the potential of the SSMP sector is evaluated in three phases: by identifying barriers to entry in fresh milk processing (5.1) and barriers to growth for those already engaged (5.2), and by discussing how likely it is to overcome such barriers or to improve the SSMPs' potential through horizontal and vertical linkages (5.3).

5.1 Barriers to entry – Perceptions, human capital and economic factors

In this chapter, barriers to entry in fresh milk processing are analysed by comparing how SSMPs using local milk differ from those using only milk powder. Statistical differences between the two groups are calculated using the variables presented in descriptive statistics. If fresh milk processors for example possess assets that the powder processors do not have, those assets might explain why some have started local milk sourcing, while the others have not.

Influence of perceptions

Surprisingly, no significant differences were found in any of the economic factors investigated, such as start-up costs and the use of formal credit, and both groups use largely the same equipment (Table 6). This is striking, because when asked directly, the respondents asserted it is the lack of equipment and the lack of money and credit that drives them to choose milk powder instead of fresh milk.

Table 6. Barriers to entry – Economic factors

Comparison of the economic indicators of the SSMPs that use local milk (first row) and that use only milk powder (second row).
The *p*-value (third row) indicates the difference between the two groups is statistically significant in none of the cases.

	N. of clients		Start-up investment costs (F CFA)		Access to formal credit		Main income		Other income		Equipment	
Local milk	Mean	81,1	Mean	1 001 176	Yes	24 %	Yes	95 %	Yes	33 %	Artisanal	64 %
	SD	91,9	SD	1 247 757	No	76 %	No	5 %	No	67 %	Machines	36 %
	Min	1	Min	250 000								
	Max	300	Max	4 500 000								
No local milk	Mean	65,5	Mean	948 633	Yes	12 %	Yes	79 %	Yes	41 %	Artisanal	77 %
	SD	110,3	SD	914 203	No	88 %	No	21 %	No	59 %	Machines	23 %
	Min	2	Min	250 000								
	Max	450	Max	3 500 000								
p-value	0,599 b		0,882 b		0,674 a		0,288 a		0,740 a		0,494 a	

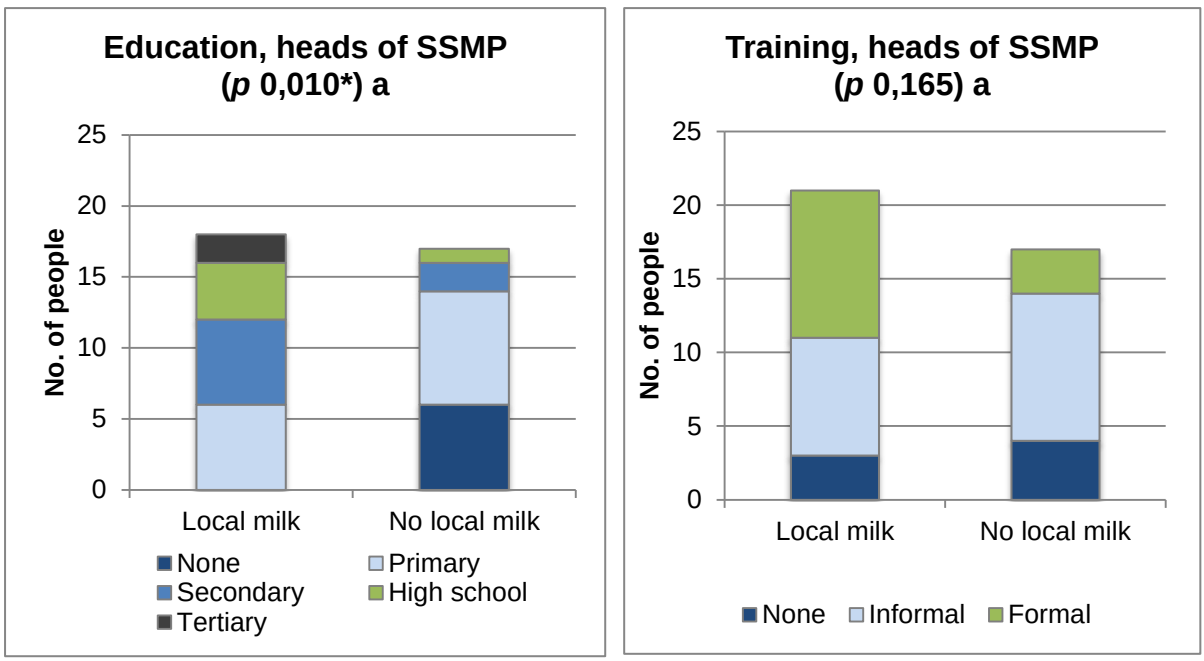
a: Fisher's Exact test (Exact Sig. 2-sided)
b: Mann-Whitney U-test (Exact Sig. 2-sided)

Since the start-up costs and equipment needed for processing are not markedly different between the two groups, it seems the SSMPs' perceptions of what fresh milk processing requires are not reflecting the reality. Many of the surveyed fresh milk processors reckoned the only special equipment one needs are a gas stove and a thermometer, which are not considerable investments. Then again, some powder processors have already invested in an extremely expensive automatic packing machine and still consider they do not have the money to start fresh milk processing. When asked what they would need the money for, the survey respondents often did not know:

"I think [the investments needed for fresh milk processing] would cost 3-5 million F CFA. You need material to start. Some processing material." (SSMP survey, Milk powder processor)

It appears that some of the major obstacles perceived by powder processors are counterfactual, because those already sourcing local milk have not encountered such entry barriers. This provides support for the argument of Frese and de Kruif (2000), calling for more attention to the reasoning of the entrepreneurs when explaining microbusiness development. Some differences can be seen in the share of entrepreneurs to whom the SSMP is the main income and in the number of clients (Table 6), but these are not significant and did not appear important in the qualitative data.

Figure 6. Barriers to entry – Human capital



Source: SSMP survey
a: SPSS Exact test (Exact Sig. 2-sided)
*: Statistical significance <0,05

Human capital

The influence of human capital is less clear. Figure 6 shows fresh milk processing is associated with higher education levels but education was never mentioned as an issue in the interviews. It may have an effect but at least the SSMPs themselves did not consider it a requirement for local milk processing. Formal training in milk processing before starting is more frequent in local milk sourcing (Figure 6) but the difference is not statistically significant (*p* 0,165). Contrary to scholarly education, many interviewees emphasized the importance of formal professional training especially in order to master hygienic practices.

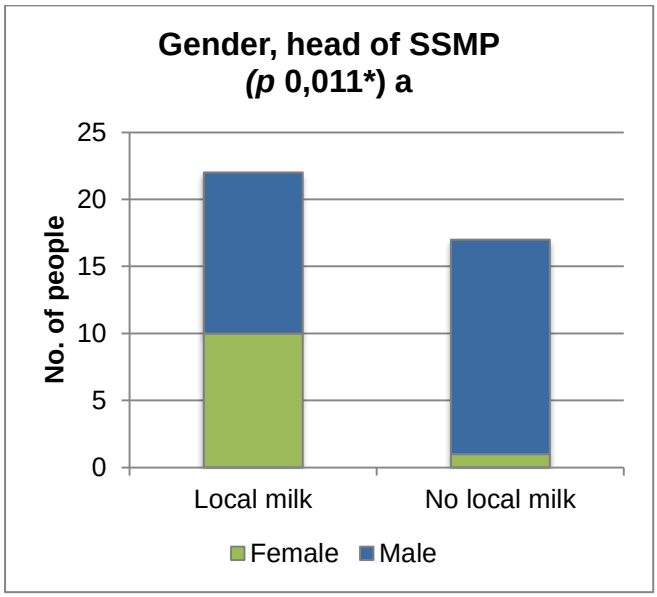
Social networks could also have an impact, as they might facilitate developing a new business. Nonetheless, no support for this was found in the data. The geographic location of SSMPs was also not a central factor, as all surveyed SSMPs are situated in a relatively small area with rather similar distances to milk production zones.

In summary, most milk powder processors perceive fresh milk processing as a costly and complicated activity that would require considerable investments and assistance, albeit to some extent this seems to base more on beliefs rather than reality. This might be the reason why in Chapter 4 many SSMPs appear unwilling to start local milk sourcing. Human capital could partly explain why such perceptions emerge but the theoretical framework highlights that alongside personal aspects, structural factors might be just as important, such as the livelihoods situation (Verrest, 2013) or macroeconomic factors (Grimm et al., 2012). Therefore, it would be simplistic to argue that the potential to start local milk sourcing depends simply on one's mindset, ambition and perceptions. Rather, perceptions might be provoked by underlying economic factors the statistical analysis could not discern, which will be analysed next.

Economic factors

The analysis on value addition showed that fresh milk processing is economically a more risky activity than milk powder processing. Two pieces of evidence indicate that besides perceptions of one's ability to upgrade, income security would be an important factor determining who starts fresh milk processing. Firstly, it seems men, often the breadwinners of the family, are more reluctant to engage in local milk sourcing than women. Figure 7 shows there are significantly (*p* 0,011) more women entrepreneurs sourcing local milk (45 % of heads of units) than in powder processing (6 %).

Figure 7. Barriers to entry – Gender



Source: SSMP survey
a: Fisher's Exact test (Exact Sig. 2-sided)
*: Statistical significance <0,05

When asked for reasons for such a difference during the participatory analysis, several respondents emphasized that men only seek for profits, which drives them to use milk powder:

"It is poverty that is pushing men towards powder processing. There is no work. Women can process fresh milk for pleasure." (Case B)

"Women can count on their husbands who make a living for the family. That is why women can go buy local milk." (Participatory analysis, Milk powder processor)

Most women processors, although not all, have a husband working in the formal sector, which is assumedly providing some economic security and thereby facilitating engagement in fresh milk processing, an economically risky activity. Men, then again, were said to be more constrained by the urgent need for profits and therefore are inclined to favour milk powder with safe profits. This finding is opposite of what the current literature suggests about female entrepreneurs being more risk-averse (Nichter & Goldmark, 2009).

The second piece of evidence is provided by Case A. This SSMP makes little profit and he has had to cut down activities and personnel during the recent years. Although he attempted local milk sourcing, he was forced to stop soon after starting. The same occurred with other initiatives he has taken, for instance when trying to open another processing unit or when

developing new flavours. In nearly all cases, it was the unsecure economic situation that prevented him from making progress:

"*There is not much left for investing in new things. Most of the profits go for schooling fees, food and such. Last year my mother fell sick. As I am the only one in the family that has some income, I had to pay the medical treatments. It was costly, as it was a cancer. Then she passed away. [---] As soon as I got paid [by my clients], we organized the funerals. No money was left for my business*." (One of many hardships shared by Case A)

Case A elicits circumstances many microentrepreneurs might live in. Their economic activity is not only influenced by their personal capacities but also by the entire household system, including wider social obligations, which influences how much risks one can take. This falls in line with Verrest (2013) who argues it is important to look at entrepreneurs holistically – embedded in a livelihood context where the personal life of the entrepreneur is taken into account in all its complexity – because these factors influence how one's business develops. Today, Case A is no more interested in local milk sourcing. He emphasized the need for money (3 million F FCA) and more equipment (large machinery) if he wished to start local milk sourcing again, despite the fact he still has all the basic equipment it was said to require. In other words, his perceptions are rather counterfactual.

Perhaps perceptions of high entry barriers emerge for a good reason: insecure conditions (those of many male processors and SSMPs resembling Case A) might make risk-taking unattractive (Figure 8) and lead to risk aversion. However, this evidence does not suffice to establish causal relations between the unsecure livelihoods situation and perceptions of high entry barriers. Rather, this is one possible explanation for why such views emerge.

Figure 8. Interplay of economic security and perceived entry barriers

One possible theory is that the level of economic security influences how big entry barriers the microentrepreneur perceives. In picture 1, the entrepreneur has low economic security, so she/he might perceive high entry barriers, which discourages risk-taking. In picture 2, the barriers seem even higher because economic security is lower. The interplay of these elements cannot, however, be confirmed and would require additional research.

5.2 Barriers to growth – Lack of milk, lack of money

Availability of milk

Even after overcoming entry barriers, the entrepreneur must still face considerable barriers to growth. According to perceptions of nearly all surveyed processors, the most pressing challenge is the low availability of local milk.

"*It would be good to use some [local] cow milk, there's a demand. But it is hard to find. People like the taste but, alas! What can you do?"* (SSMP survey, Milk powder processor).

This was often repeated throughout the survey interviews and was considered a matter of fact to which one could not do much. The respondents claimed there simply is no milk especially during the dry season when the demand is high. Even Case C, one of the most successful SSMPs in Bobo-Dioulasso, is constantly encountering problems with milk availability during the dry season, despite having a group of regular milk collectors and over ten years of experience.

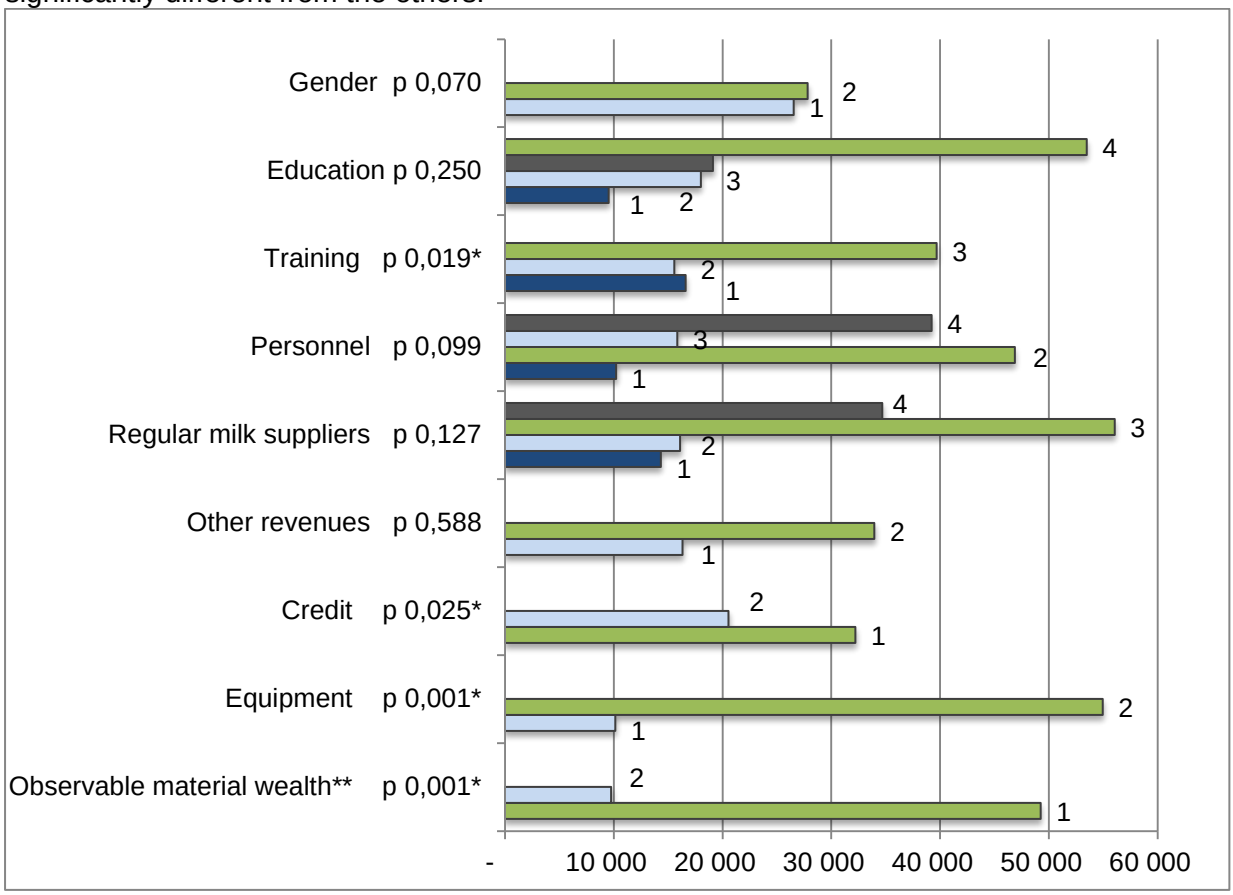
The estimation of the assumed annual milk production around Bobo-Dioulasso suggests there remains milk to be exploited (Figure 4, p.44). Still, further studies are required among milk producers in order to estimate how much more could be commercialized and processed. Probably the pressing question is not whether there is milk but whether one is able to find the suppliers. In particular, most processors underlined their wish to find *reliable* producers and collectors and to reduce their number in order to foster tighter relations. Statistical tests (Figure 9) suggest that SSMPs having 10-20 milk suppliers collect annually more milk than those with more than 20 suppliers, although the result is not statistically significant (*p* 0,127). Also Corniaux et al. (2014, pp.58-59) highlight that managing supplier relations is one key to success for SSMPs.

Need for investments

Besides the lack of milk, the lack of money as a barrier to growth became evident in a number of ways. First of all, the analysis on value addition showed already that profit margins from fresh milk processing have high seasonal variation. During the dry season the profit per litre can be less than a third of those from milk powder processing. When sourcing local milk, "*one must accept you won't make much profit"* during the dry season (SSMP survey, Local milk processor). This is an economic risk one must be able to bear.

Figure 9. Barriers to growth

Comparison of the amount of raw milk collected annually (litres, x-axis) across different variable groups (see variable groups below). The *p*-value indicates if at least one group is significantly different from the others.



Source: SSMP survey

Gender (a):	1) Female	2) Male		
Education (b):	1) Primary	2) Secondary	3) High school	4) Tertiary
Training (b):	1) None	2) Informal	3) Formal	
Personnel (b):	1) 1-5	2) 6-10	3) 11-15	4) >15
Milk suppliers (b):	1) 0	2) 1-9	3) 10-19	4) ≥ 20
Other revenues (a):	1) Yes	2) No		
Credit (a):	1) Yes	2) No		
Equipment (a):	1) Artisanal	2) Machines		
Material wealth (a):	1) Yes	2) No		

a: Mann-Whitney U-test (Exact Sig. 2-sided)
b: Kruskal-Wallis test (Asymptotic Sig. 2-sided)
*: Statistical significance <0,05
**: Observable material wealth denotes the SSMP head has remarkably higher living standards than average households, e.g. two-storey house or a car. This variable must be interpreted with great caution because it bases on observations and can hide indebtedness or other hardships that impair the household's real economic circumstances.

Another crucial barrier is equipment. Statistical tests suggest that those using artisanal equipment collect annually on average around 10 000 litres of raw milk (Figure 9). In contrast, those with machinery collect 55 000 litres (*p* 0,001). The importance of mechanization was apparent already in case study descriptions[31], as machinery (Case C) allows processing a ten-fold amount of yoghurt compared to artisanal processing. Lastly, access to formal credit and having observable material wealth correlate with more local milk sourcing, and these differences are statistically significant (*p* 0,025 and *p* 0,001, respectively).

Merely observing correlation between these factors and large quantities of local milk sourcing does not imply any causality. However, all these three factors (equipment, credit, observable wealth) emerge strongly also in the qualitative data. Investments in equipment were by far the most often mentioned factor when discussing what increasing local milk processing would require. Often the investment costs were estimated so high (20 - 100 million F CFA) that formal credit would be necessary. And in order to obtain credit, the interviewees emphasized one would need considerable material wealth as collateral.

Finally, the processors perceived a legion of other barriers to growth, ranging from dishonest milk suppliers (a recurrent story is that some milk producers or collectors dilute milk with water, making it unsuitable for processing) to technical difficulties when fermenting fresh milk-based yoghurt (the fermentation process did not start with all kinds of fresh milk but with milk powder the success was usually guaranteed). These examples highlight the vast amount of risks associated with fresh milk processing. And again, human capital seems to be important, as higher education level (*p* 0,250) and formal training (*p* 0,019) correlate with large local milk sourcing volumes. However, the result is significant only for the latter and only the role of training in processing, not education in general, was mentioned by the respondents themselves.

All in all, economic barriers to growth appear substantial, and they are especially challenging in a context where financial services are limited. The remaining question is how likely it is that SSMPs could overcome the identified barriers. This will be discussed in the remaining part of the chapter.

[31] See Chapter 4.1

5.3 Overcoming barriers, improving potential

Need for assistance

The previous analysis leads to believe that many perceived entry barriers do not necessarily reflect the reality and that such counterfactual perceptions might be influenced by income insecurity. If so, having the courage to enter local milk processing would require achieving more secure livelihoods circumstances. The presented literature review indicates this is something many people in sub-Saharan Africa, including microentrepreneurs, strive for their lifetime. Thereby, successful upgrading would be relatively exceptional in these conditions.

Barriers to growth are not much easier to surmount. In regards to the availability of milk, an optimist might say that there is more milk available in Bobo-Dioulasso and that managing supplier relations is a matter of skills one can learn. Skilful entrepreneurs could also make substantial profits and overcome economic barriers by accumulating capital that would allow taking credit and investing in larger equipment. The role of 'leadership skills' is also underlined by Corniaux et al. (2014, pp.61-62). But due to challenges mentioned in the literature review, the entrepreneurial talent of the SSMPs is not investigated in this study. Nonetheless, the literature suggests that succeeding is also a question of the enabling environment (Grimm et al., 2012; Verrest, 2013) and other nodes of the value chain (Kaplinsky & Morris, 2002, p.9). In Burkina Faso, for instance milk production during the dry season, as well as infrastructure and financial services are areas with plenty of room for improvement before processing could take off on a wider scale.

Despite the windows of opportunity for dynamic entrepreneurs, the overall picture is rather grim. Both the barriers to entry and growth seem to be linked to very fundamental problems of growth in the MSE sector: income insecurity, lack of credit, often low level of education. Therefore, it is safe to say the upgrading potential of SSMPs is very limited without assistance.

Hardships of horizontal and vertical cooperation

Upgrading potential should, however, not be considered a static characteristic – on the contrary, it can change and be changed. One could imagine a host of development interventions to improve SSMPs' potential from credit services to training in business management, but discussing them all would be an exhausting exercise. Forming horizontal and vertical linkages is one of the most often promoted ideas in value chain development, and could be imagined for the dairy value chain, too. But the case of the project PAPSA

shows that as of today, such linkages have not improved the SSMPs' upgrading potential in Bobo-Dioulasso due to mistrust and inability to work together. The case of PAPSA is presented in Box 1, eliciting the hardships of stakeholder cooperation. Roy and Wheeler (2006) suggest that the reluctance to cooperate stems from attitudes typical to survival-type of microentrepreneurs: working together with someone is a risk, as you cannot fully control how your partners work and respect the rules. However, in Bobo-Dioulasso also the successful SSMPs were found to avoid horizontal and vertical cooperation, denoting this is not a characteristic of only survival entrepreneurs but might be common to MSEs more widely.

All in all, it seems challenging to count on MSEs as drivers of value chain development. Although microbusinesses are today said to greatly contribute to local economies in sub-Saharan Africa, this study suggests their ability to act as motors of growth is limited. In the case of milk processing, most SSMPs would need support both on micro- and macro-levels, just as Berner et al. (2012) argue. Moreover, seconding ideas presented by Berner et al. (2012) and Nichter & Goldmark (2009), a distinction should be made between different kinds of entrepreneurs when designing development interventions. The previous analysis implies that one should not seek to help all through the same measures because barriers are different when entering and when expanding the business. If the aim was to increase the volumes of local milk processing, this could be done by allocating credits for those SSMPs already experienced in local milk sourcing and willing to grow[32], so that they could invest in larger-scale equipment. If the objective was to alleviate urban poverty, a better way might be to develop safety net systems that allow more risk-taking among the milk powder processors, which could make the entry barriers appear easier to surmount.

Box 1. Horizontal and vertical linkages through PAPSA

As mentioned in the literature review, there are several stakeholder organizations in the dairy sector in Burkina Faso. Also in Bobo-Dioulasso, SSMPs have initiated some horizontal linkages by founding the Association of milk processors of Bobo-Dioulasso. However, the association has been inactive because of internal disagreements, and there is a widespread suspicion towards fellow processors.

[32] See the first type described in Chapter 4.2 p.47

"This is a problem for us Africans. We want to work together but as soon as you choose a leader, and as soon as you see something goes wrong, you leave and go work on your own. This is what prevents us from developing." (Case B)

Interviews revealed that also the Government's flagship programme for SSMPs, PAPSA[33], seems to have failed and is today seriously questioned by the assumed beneficiaries. In Bobo-Dioulasso, it was found that PAPSA constructed four cooperative milk collection centres in 2015, of which only one is functioning to some degree. Again, the experienced problems are related to cooperation, both horizontally and vertically. Horizontally, milk producers have hard time forming cooperatives and agreeing on how to run the centres because of mistrust. Vertically, the aim was to connect cooperatives to chosen SSMPs who would buy the collected milk. But numerous disagreements between cooperatives and SSMPs on prices and payments have made vertical linkages disappointing. In Bobo-Dioulasso, all four SSMPs originally involved in PAPSA have abandoned the program and have no intensions of re-engaging.

"[Planning of the project] was a waste of work. I don't want to pass by that centre to get my milk. I prefer working by myself." (Complementary interview, Local milk processor)

The only operational milk collection centre in Bobo-Dioulasso constructed by PAPSA leaves some hope for those who believe in the SSMP sector. The cooperative collected around 17 000 litres of milk in 2016, slightly more than one average SSMP needs per year. If all planned milk collection centres in Bobo-Dioulasso, six in total in 2018, will function and attain the same level, some 100 000 litres more milk could be processed and directed to urban consumers every year. This, however, largely depends on the stakeholders' capacity to work together, which so far has proved to be extremely hard.

[33] See Chapter 3.1, p.28

Chapter 6.

Employment impacts

The previous chapter showed the potential of SSMPs to increase local milk sourcing is very limited without assistance. This chapter aims at demonstrating what kind of employment impacts increasing local milk sourcing creates today, to see what an expansion would mean for local employment.

6.1 Employment impacts in SSMPs

Overall, the surveyed SSMPs appear as dynamic employers and the heads of units did not seem to be afraid of increasing their personnel, even if the enterprise was still young. The surveyed SSMPs employ on average 8,7 people and the employment relative to production is 4,7 people per 100 litres ME produced (Table 7). When only looking at those SSMPs that source local milk, they generate income roughly to seven milk producers and collectors in addition to their own personnel. However, only those producers supplying their client SSMPs regularly (at least once per week) were taken into account. Cases where the SSMP decides to buy milk occasionally from producers and collectors passing by, which some SSMPs do during the rainy season, are excluded. Furthermore, only one person per livestock farm was taken into account but the ILRI studies in Kenya and India showed that a high number of labour force is behind primary production (Staal et al., 2008a, 2008b). Therefore, the actual number of people who benefit from milk processing is even higher. All in all, the employment impact is stronger to what some sources suggest, arguing that microbusinesses rarely recruit and if they do, usually less than four people (Liedholm, 2001; Mead & Liedholm, 1998). In the SSMP sector, though, similar employment impacts have been found by Corniaux et al. (2014) but when considering employment relative to production, the employment impact is remarkably higher than in findings in Kenya and India (Staal et al., 2008a, 2008b).

Despite the high number of jobs created, the quality of the employment might not always be adequate for a secure income. On average 40 % of the personnel worked part-time, either as a rule or according to the market demand (Table 7). Many SSMPs were reluctant to reveal their monthly salaries but the average of the reported wages (35 000 F CFA) is close to the national minimum salary of 32 218 F CFA. Case C revealed, however, that there might be important discrepancies among the personnel. In general, those hired to distribute processed products to boutiques were often paid as a percentage per sales and in Case C,

they could gain more than twice as much as other employees. By default, this creates gender inequalities, because only men were hired as distributors in all surveyed SSMPs. Lowest salaries were reported for cleaning staff, which was only women's task.

Although men represent the majority in the SSMP personnel, around 43 % of SSMP workers are women, which is an important finding in a context where labour markets are skewed towards employing men. The number of youth was not accurately reported but according to observations, at least a third of the employed, both women and men, are under 30 years old. Only one head of unit was under 30 years old, while the majority were between 40-50 years old. The low share of youth in heads of units is probably due to initial investments required before starting, which are hard to finance if one has no prior savings. The only young SSMP owner had no start-up costs, as he took over an already started and fully equipped processing unit. Lastly, the jobs seem to be easily accessible to people without or with low education, as it was very rare for SSMPs to require literacy from employees and they were always trained at work.

Table 7. Employment in all SSMPs

	N	Mean	SD	Median	Min	Max
Personnel (n. people) **[1]**	**39**	8,7	7,50	6	1	32
Personnel (n. people) / 100 litres ME produced	**39**	4,7	2,44	4	1	11
Part-time personnel **[2]**	**39**	39,2 %	42,68	17 %	0	100 %
Women in personnel	**39**	42,8 %	25,80	50 %	0	86 %
Milk producers and collectors associated (n. people**) [3]**	**22**	7,1	8,19	3	0	34
Total employment (n. people) **[4]**	**39**	12,6	10,86	10	2	57
Salary (F CFA/month)	**25**	34 565	16 416,7	30 000	12 000	75 000

Source: SSMP survey

1 Personnel whose salary is paid by the SSMP. E.g. external delivery services not included. SSMP owners are included.
2 Percentage of the personnel working max. 4 hours/day or max. 3 days/week
3 Milk producers and collectors who deliver milk regularly. One SSMP buys milk only irregularly from various suppliers, and was given value 0, as this did not create regular revenue for any producers or collectors.
4 Personnel + Milk producers and collectors associated

6.2 Employment in local milk processing

The presented findings reveal SSMPs in general are effective generators of employment but the question of particular interest is if local milk sourcing would yield different results when

compared to exclusive milk powder processing. At first glance, it seems that fresh milk processors create largely the same type of employment as exclusive milk powder processors. The statistical analysis (Table 8) shows they both employ on average 4,5 - 4,8 people per 100 litres ME of dairy products produced, the share of women in personnel is around 40 % and monthly salaries are close to the minimum wages of around 32 000 F CFA. However, these results are not statistically significant. One difference can be detected in the share of personnel working part-time, which is higher in milk powder processing, 55 %, compared to 26 % in fresh milk processing. Yet, the significance test (*p* 0,073) does not give support to generalizations.

Table 8. Employment created by local milk vs. milk powder processing
Comparison of the employment indicators of the SSMP that use local milk (first row) and that use only milk powder (second row). The *p*-value (third row) indicates if the difference between the two groups is statistically significant.

	Personnel (n. people) / 100 litres ME produced **[1]**		Total n. people associated / 100 litres ME produced **[2]**		Women in personnel		Part-time personnel		Salary (F CFA/month)	
Local milk	Mean	4,8	Mean	8,8	Mean	48 %	Mean	26 %	Mean	31 397
	SD	2,44	SD	4,99	SD	23,551	SD	33,305	SD	13 535
	Min	2	Min	3,3	Min	0 %	Min	0 %	Min	12 000
	Max	11,1	Max	23,3	Max	86 %	Max	100 %	Max	66 666
No local milk	Mean	4,5	Mean	4,5	Mean	36 %	Mean	55 %	Mean	37 996
	SD	2,50	SD	2,50	SD	27,805	SD	48,477	SD	19 065
	Min	1	Min	1	Min	0 %	Min	0 %	Min	12 500
	Max	9	Max	9	Max	78 %	Max	100 %	Max	75 000
p-value	0,644 b		0,002* a		0,170 a		0,073 aa		0,326 a,c	

Source: SSMP survey

1 Personnel whose salary is paid by the SSMP. SSMP owners are included.
2 Personnel of the SSMP + milk producers and collectors regularly delivering milk
a: Independent samples *t*-test (Sig. 2-tailed) Equal variances assumed
aa: Independent samples *t*-test (Sig. 2-tailed) Equal variances not assumed
b: Mann-Whitney U-test (Exact Sig. 2-sided)
c: Low number of observations (n = 25 out of 39)
*: Statistical significance $p < 0,05$

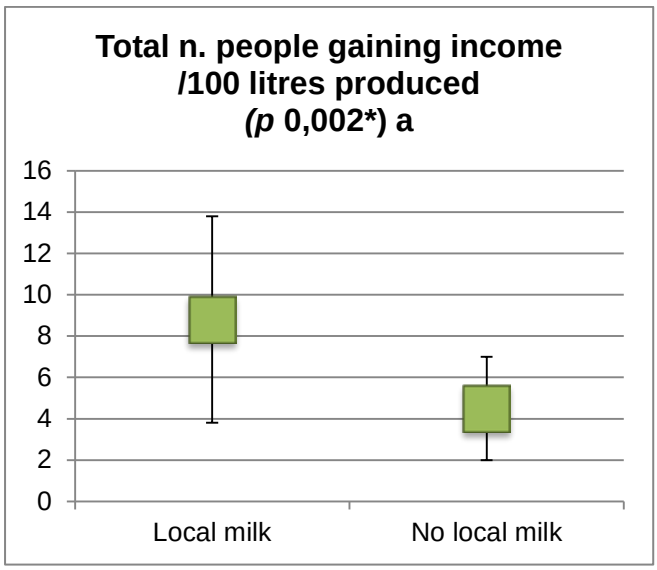
When including milk producers and collectors in the number of employed people, the outcome changes markedly (Table 8, second column). Measured in this way, local milk

processors generate income to twice as many people per 100 litres ME (8,8 people) compared to milk powder processors (4,5 people), and this result is statistically significant (*p* 0,002) (Figure 10). The difference would be even larger if occasional milk suppliers and labour force at livestock farms were included in the calculation. This result is by no means a surprise but corroborates the very intuitive idea that local milk processing must create more employment by default: it not only involves the SSMP personnel but also the milk suppliers. The difference between the first and second column in Table 8 also demonstrates that fresh milk processing generates more employment particularly because of local milk sourcing (i.e. when milk suppliers are taken into account) and not, for example, because of processing techniques that would require more labour force.

Considering both personnel at SSMPs and milk suppliers gives a richer image of the actual employment impact of local milk sourcing. It shows how SSMPs can stretch their employment impact from urban zones to surrounding peri-urban areas. On average, milk suppliers come to deliver milk from 15-20 km outside the city. Essentially, this illustrates the power of local value chains to foster wider development: urban markets generate income for farmers outside urban zones where employment opportunities are scarce. This is not the case when relying on imported raw materials.

Figure 10. Total number of beneficiaries in SSMPs

Local milk processors create income on average to 8,8 people per 100 litres ME of dairy products (SD 4,99), and those not using local milk to 4,5 people per 100 litres ME (SD 2,50).



Source: SSMP survey

a: Independent samples *t*-test (Sig. 2-tailed). Equal variances assumed
*: Statistical significance <0,05

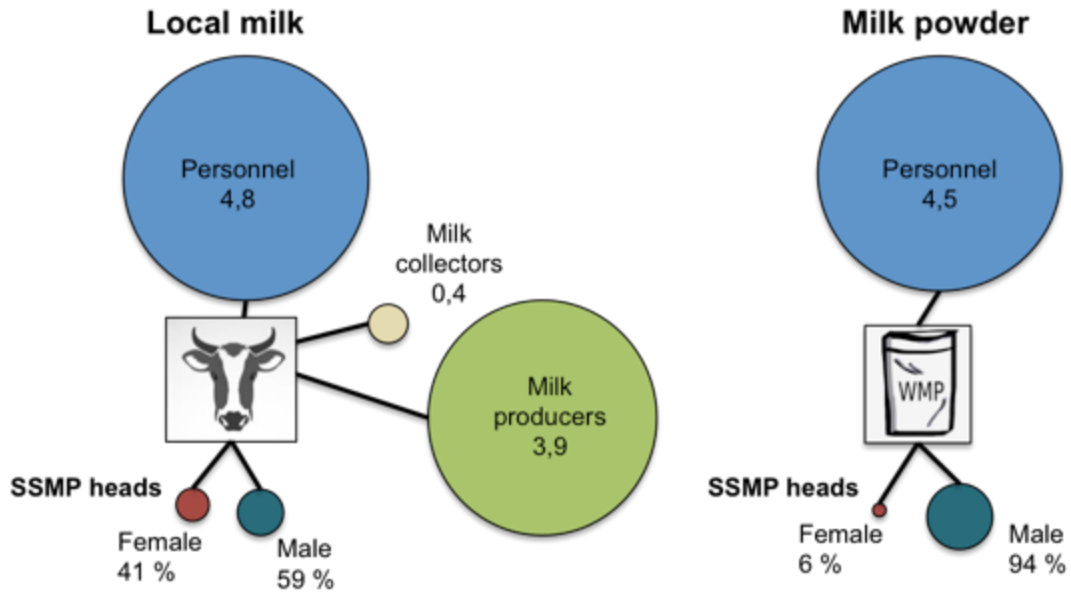
Employment for women

Furthermore, local milk processing offers income-generation possibilities for women. In personnel, their share is not significantly different than in units using only milk powder but Chapter 5.1 showed there are more female heads of unit in local milk processing than in the powder sector (Figure 7, p.54). Interestingly, the data suggest that due to milk powder processing, the dairy sector has experienced some 'defeminization' (as in Schneider et al., 2007). Between 2012-2016, at least 12 new units processing exclusively milk powder started, of which 11 are run by men. As highlighted above, men are more inclined to favour milk powder processing, leaving the fresh milk sector (at least partly) for the population group it traditionally belongs to, women. Therefore, the possibility for fresh milk processing is in a way protecting women from further defeminization.

On the whole, this analysis suggests local milk sourcing offers more employment to a more diverse group of people than milk powder processing (Figure 11). What it also shows is that employment impacts are essential to take into account when analysing value chains. Classic analysis of value-addition (Table 4, p.47) made local milk sourcing appear less attractive compared to powder processing. When looking into the distribution *within* one node, i.e. the income it generates, the findings are more positive.

Figure 11. Overall employment impact of SSMPs

The average number of people to whom SSMPs create employment in SSMPs that use local milk (left) and those that use only milk powder (right). All values are n. people gaining income per 100 litres ME produced. Below, the proportion of female and male heads of unit.



Source: SSMP survey

Revenues of milk suppliers

A full-scale survey among milk producers and collectors was not done but rapid interviews were conducted with 15 milk producers. Out of 15 suppliers, 13 considered milk sales as their primary source of income. One important caveat is that some interviewees found it hard to differentiate between revenues from milk sales and from selling animals or from other livestock-related income. Nonetheless, milk sales were considered important especially because many producers deliver milk, and therefore get paid, every day, whereas meat and animal sales occur only occasionally. This contradicts the findings of Dossa et al., (2015) where milk is considered of lesser importance for livestock producers in Bobo-Dioulasso.

Also the data on gross income accrued to milk suppliers (Table 9) suggest milk sales can generate considerable monthly revenues. Daily median sales of the interviewed suppliers are around 2 000 F CFA during the dry season, which would mean as much as 60 000 F CFA per month, increasing to up to 140 000 F CFA per month during the rainy season. Production costs would need to be subtracted to discover net income but unfortunately, accurate estimation of production costs would require comprehensive interviews on feeding practices at different times, costs of a variety of feed supplements, remuneration practices for family labour, to mention but a few variables, which was out of the scope of this study. One can assume these producers use feed supplements and have some veterinary costs, since their average quantities of milk delivered per day (5-11 and 13-19 litres for dry/rainy season) are higher than at average livestock farms around Bobo-Dioulasso (Hamadou & Kiendrébéogo, 2004). This can cause considerable monthly costs, and so the estimated monthly sales cannot tell much about the actual income these suppliers gain. In order to fully evaluate the employment impact of local milk sourcing, future research should concentrate on investigating the producers' costs and profits.

These 15 interviews also suggest that smallest producers are less likely to become SSMP suppliers. Only five producers correspond to the profile of an average extensive smallholder outlined in Hamadou & Kiendrébéogo (2004) with less than five litres of milk produced daily during the dry season. This supports the common finding in the value chain literature that the smallest and the most marginalized have hard time accessing the markets.

Table 9. Average raw milk sales of 14 suppliers

NB. 14 of the 15 interviewed milk producers could quantify their supplied volumes and revenues

	Revenues from milk sales/day (F CFA)		Milk sold/day (litres)	
Dry season	Mean	4 258	Mean	11,4
	Median	2 000	Median	5
Rainy season	Mean	7 150	Mean	19,6
	Median	4 800	Median	13,5

Source: Case studies and supplementary interviews with milk producers

Quality of employment

In terms of quality of employment, both fresh milk and milk powder processing seem to struggle with the same problems (Table 8). The share of part-time employment is relatively high, and in some cases the actual income may be fluctuating according to sales.

"The work depends on orders [the clients make]. You see, today we're doing nothing." [NB. Three employees are washing freezers and sitting around, others are not present.] "But yesterday they were working. If there's an order, we work for the entire day." (Participatory analysis, Milk powder processor)

Also the reported wages appear low in local milk processing, slightly under the official minimum salary of approximately 32 000 F CFA/month. The reported wages might have an upward bias as they were given by the heads of units themselves, and there are no data on possible delays or ruptures in payments following the market situation. Moreover, only one SSMP has a retirement and assurance scheme for their employers. In the light of this evidence, many local milk processors seem fairly weak as providers of high quality employment but on the other hand, it shows microentrepreneurs do have the capacity to generate at least some income to a rather high number of people. This does not only benefit the urban zones but also those rural producers who can participate in these chains.

In the end, while admitting the strong employment impact of local milk sourcing, one should not ignore the development in employment and entrepreneurship that milk powder has triggered during the last years. Milk powder processing is flourishing because it is an easy-access income generation activity for the urban survival-entrepreneurs. Without milk powder, many SSMPs would presumably have hard time compensating the low profitability of fresh

milk processing during the dry season. Seeing the risk-aversion of some entrepreneurs and the appetite for cheap milk powder[34], many SSMPs might not exist at all.

6.3 How about some industrialization?

Because of low mechanization in SSMPs, one would assume they employ more people per litre produced than industrial processing units. In the context of Burkina Faso, this is not possible to investigate thoroughly, as industrial dairies do not exist (yet) and semi-industrial ones are few. Only three semi-industrial units were identified in Ouagadougou and one more is operating in Fada N'Gourma. Although the data are not sufficient to fully compare industrial and small-scale units, they give some first impressions of the impacts of each processing strategy.

Of the two semi-industrial dairies interviewed in Ouagadougou[35], one (run by a religious community) employed 1,5 people per 100 litres ME and the other (state-owned and heavily subsidized) employed three people per 100 litres ME[36]. Similar levels are found in case studies of Corniaux et al. (2014, p.103). While the former relied exclusively on the dairy's own farm, the latter bought milk from local producers. This raises their amount of beneficiaries to around 10 people per 100 litres ME, but this is only one possible estimation, as it is not sure how many of the suppliers deliver milk regularly. Interestingly, especially the state-led dairy does not differ much from SSMPs in terms of employment generation (personnel of 3 vs. 4,8 people per 100 litres, respectively). However, these apparently small differences yield important discrepancies when analysed in absolute terms. If the industrial dairy in Ouagadougou comes into being, it is likely that it will not operate at full planned capacity of 30 000 litres per day, at least not throughout the year, since such production level would be phenomenal in sub-Saharan Africa and it would surpass the current demand in urban Burkina Faso (see Hamadou et al., 2007). With assumed daily production of 10 000 litres per day (still extremely high) and with 1-2 people employed per 100 litres produced, as in the largest dairies surveyed by Corniaux et al. (2014, p.103), the dairy would employ 100-200 people. In contrast, if SSMPs produced the same amount with a personnel of 4,8 people/100 litres, 480 jobs would be created. This includes only the processing units without taking milk suppliers into account. But as no recruitment plans for the future dairy have been made public, these calculations remain speculative.

[34] See the third and last groups described in Chapter 4.2 pp.47-48
[35] At least three were identified but one was not available for an interview.
[36] Five people if the state officials hired at the dairy are included

Ultimately, looking at numbers is not sufficient because what also counts is who can get employed by the industrial dairy. Will jobs be accessible to women and youth and to people with low education levels? Can smallholders become milk suppliers or will the dairy have to rely mainly on larger producers? SSMPs have proved to be rather strong at least in regards to the accessibility of jobs in processing. It depends on the design of the industrial dairy project whether they can do the same.

Chapter 7.

Impacts on imports

7.1 Milk powder is here to stay

The study departed from the premise that increasing local milk sourcing in small-scale processing units could help to curb milk powder imports. This chapter suggests this might not be the case. Firstly, because of the strategic importance of milk powder for the SSMPs. Secondly, because of the apparently small share the SSMPs use of the total milk powder imports. Before digging into these aspects, the possible future volumes of milk powder imports will be outlined to establish a business-as-usual scenario.

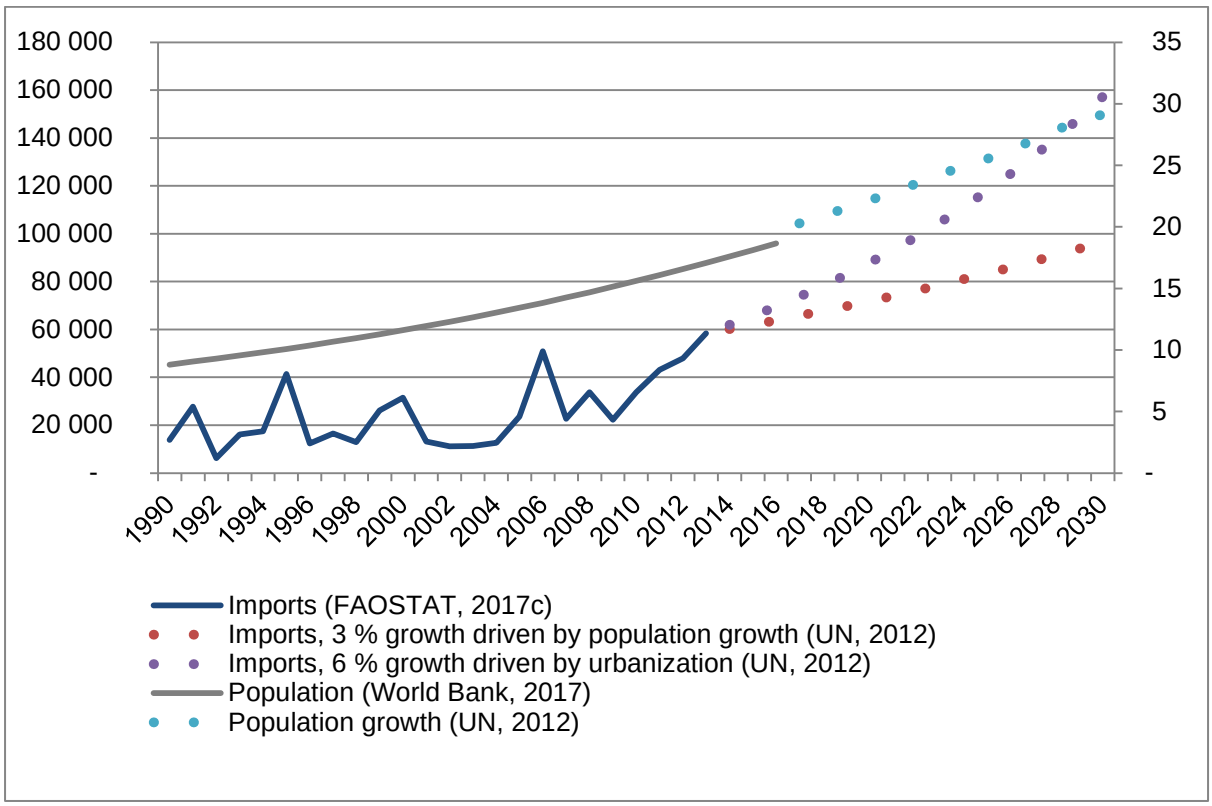
A simplified estimation of the future milk powder imports can be done by assuming the imports will rise at the same pace as the population is expected to grow, 3 % per year (UN, 2012). This is a conservative estimate, considering that according to the FAO milk powder imports have been rising on average by 5 % annually between 1990-2013 (FAOSTAT, 2017c). Moreover, the speed of urbanization, 6 % per year (UN, 2012), is two-fold compared to the overall population growth, and milk powder is assumedly more consumed in urban areas (Gerosa & Skoet, 2013). For sure, imports are not solely driven by the increase in demand and a multitude of other factors influence them: domestic production (e.g. farm management and access to feed and water), trade policies, production decisions in the exporting countries, world prices and the development of other markets for milk powder. Growth in domestic production has been weaker than population growth for the last decade (2 % annually in 2005-2014 in MRA, 2015). Furthermore, Orasmaa et al. (2016) suggest that considering the end of the EU milk quotas in 2015, accompanied by the liberal trade policy orientation of the ECOWAS, milk powder imports will increase in West Africa in the coming years. As to the dairy world prices, they have been very volatile but the OECD and FAO (OECD/FAO, 2017) estimate that the level will remain rather constant. All in all, no remarkable constrains for expanding imports are at sight.

Figure 12 shows that milk powder imports would rise up to 95 - 155 million tons by 2030 in a business-as-usual scenario. If the domestic production rises at steady 2 % per year as for the last decade, the gap between local and imported milk would widen. By 2030, milk powder imports would account for 22-30 % of the assumed total consumption, whereas

today they represent some 15-20 %[37]. The share would be even higher if other imported products were included in addition to milk powder. The fundamental question is whether these predictions would change if SSMPs increased local milk sourcing in the future.

Figure 12. Projection of milk powder imports in 2030 (tonnes ME)

NB. Use right y-axis for population (million people).



Milk for diversification, powder for profits

Intuitively, increasing local milk sourcing might influence milk powder imports but in reality, it appears that in SSMPs, fresh milk is often considered a supplementary ingredient and not a substitute for milk powder. In this sample, 17 SSMPs use both fresh milk and milk powder as primary material. Some of these units (n=6) have fresh milk as a substitute for powder, i.e. they reduce their use of milk powder when local milk is available. However, the majority (n=11) use local milk for products one can only make with fresh milk, mainly liquid milk[38] but

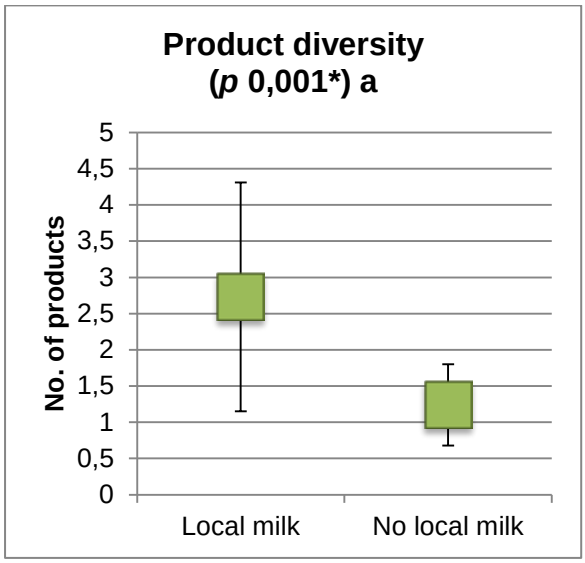
[37] See Chapter 3.2, p.31

[38] It is possible to reconstitute liquid milk from milk powder but it was said to have a distinguished taste that the processors did not appreciate.

keep milk powder as a basis for their yoghurt production. The prevalence of this kind of diversification strategy is supported by the statistical analysis (Figure 13), which shows that fresh milk processors do have a larger product variety (*p* 0,001).

Figure 13. Product diversity in SSMPs

Local milk producers process on average 2,73 products (SD 1,579), while those not using local milk process 1,24 products (SD 0,562).



Source: SSMP survey
a: Mann-Whitney U test
*: Statistical significance <0,05

Also when discussing with SSMPs relying exclusively on milk powder, it became clear that for them, fresh milk would be primarily an addition if they ever started local milk sourcing, and it would not replace milk powder:

"If everything was organized [financing and collective milk supply] we could add fresh milk [in our production]. But of course we would also work with powder, people like it." (SSMP survey, Milk powder processor)

Analysing costs and profits in Cases B and C also revealed milk powder has strategic importance for SSMPs because it balances the lower profitability of fresh milk processing[39]. Same type of findings has been done for example in dairies in Senegal (Ferrari, 2017). Moreover, fermentation of yoghurt was said to be more difficult with fresh milk but not with milk powder[40], which is why some fresh milk processors add milk powder in their yoghurt mix as a common practice. Some also claim consumers prefer the taste of milk powder in yoghurt, which is why it cannot be replaced with raw milk.

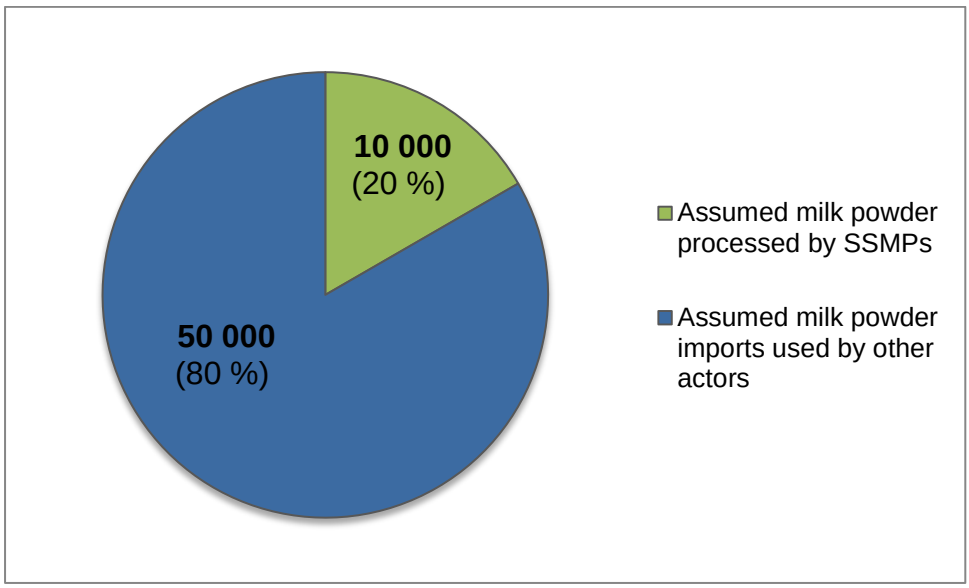
[39] See Chapter 4.2, p.46
[40] See Chapter 5.2, p.57

Against this backdrop, it seems that even if local milk gained a bigger role in SSMPs in the future, it might not affect the quantities of milk powder processed. It is likely to increase the production of liquid milk but it would not replace powder to a large extent. It must also be noted that among processors, the conception of 'local' milk is not well established. Some few fresh milk processors were seemingly advocating local production and have initiated processors' associations to fight for their cause. The vast majority, however, never mentioned local origin as a motivation to source fresh milk, or not even used the word 'local', nor talked about milk powder as a foreign, imported product. The issue of import dependency seems to concern only the few advocate-type of processors and leaders of stakeholder organizations but apart from this, the 'Sankarian' ethos of self-sufficiency seems to be at low ebb.

Small share of total imports

Although it seems unlikely SSMPs notably decreased their use of milk powder, Figure 14 illustrates it would have a limited effect on milk powder imports even if they did. The amount of milk powder assumedly used in the SSMPs in Burkina Faso pales in comparison to the colossal volume of total imports: extrapolating the findings made in Bobo-Dioulasso to cover the whole country (see calculations in Appendix 5), SSMPs are estimated to process around 10 million litres ME of milk powder per year, while the annual imports are today at least 60 million litres ME (FAOSTAT, 2017c).

Figure 14. Estimation of milk powder processed in SSMPs in Burkina Faso vs. milk powder imported (tonnes ME)



Source: Extrapolation of SSMP survey (see Appendix 5) and FAOSTAT, 2017c

However, this comparison gives rise to several questions regarding the actual magnitude and end use of the imported powder. Considering that there are no industrial-scale dairy processors in Burkina Faso, it is surprising to see quite a narrow share of imports (around 20 %) processed in SSMPs. If SSMPs are not absorbing the milk powder imports, who are, and could some other sector influence imports more effectively? It appears that data on the actual nature, magnitude and use of the imported milk powder are inadequate to accurately respond to this question. Consumer studies done in Burkina Faso have not quantified the consumption of different powder-based products and the supply side of the story is even more obscure: obtaining data on milk powder imports from the custom officials was not possible, few importers were reached for an interview and those reached either did not have or did not want to share any information on their market share or their clients. Also the share of powder processed in SSMPs is a rough extrapolation. It bases on the situation in Bobo-Dioulasso, where the expansion of SSMPs is however relatively recent, and it is not known how much the situation differs in other cities, or rural zones. Therefore, firm conclusions cannot be drawn and Figure 14 must be interpreted with caution.

In the light of these data, one can however suggest that the impact of SSMPs on imports is rather limited. But as we do not know how the imported milk powder is used, by whom, and why, it becomes challenging to assess whether any other segments of the dairy market could influence imports any more effectively.

7.2 Evidence from other countries

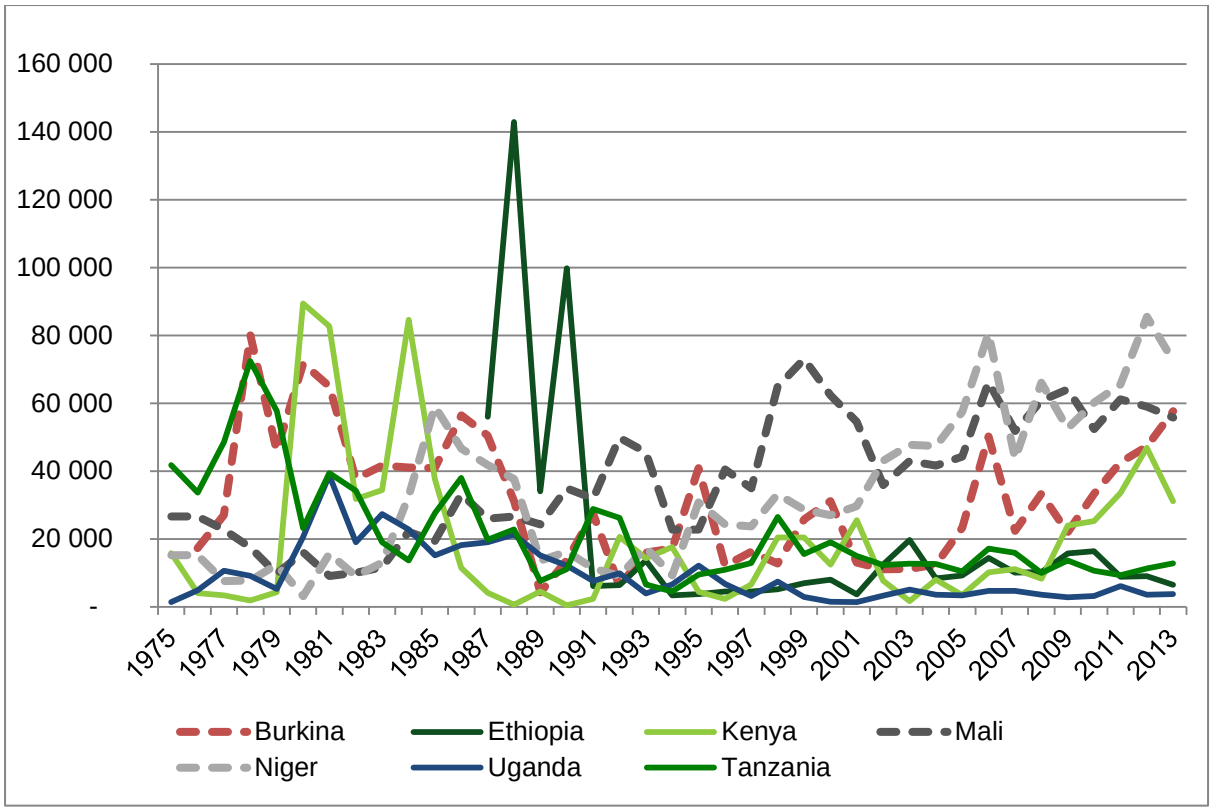
The literature emphasizes that the primacy of imported dairy products is not a challenge only in Burkina Faso but is diagnosed in most countries in West Africa (e.g. Duteurtre & Corniaux, 2013). According to the FAO, milk powder imports have been on the rise in nearly all Sahelian countries from the early 2000s (FAOSTAT, 2017c). Interestingly, the upward trend coincides with the emergence of SSMPs in the region (Corniaux et al., 2014). However, SSMPs might not be the primary cause behind the imports, since the previous analysis suggests that at least in Burkina Faso, these units would process a rather limited share of imports.

In East Africa, the story is very much different. For example Ethiopia, Tanzania and to some extent Uganda received massive amounts of milk powder during the golden age of powder exports, the 1970-80s, but the levels started to fall in the early 1990s and have thereafter remained low (Figure 15). According to FAOSTAT (2017b, 2017c), milk powder imports

correspond to less than 1 % of the total milk consumption in these countries, whereas in Burkina Faso they represent 15-20 %[41]. Kenya, then again, is importing increasing amounts of milk powder but as mentioned in the literature review, it has simultaneously built a competitive processing industry and has become dairy exporter (Staal et al., 2008a).

Throughout sub-Saharan Africa, climatic conditions and the prevalence of resource-poor smallholder farming make milk production innately challenging. It appears logical that it is Kenya and South Africa who have been able to create an export industry, as the technology for processing exportable products (milk powder, UHT milk, concentrated milk) is extremely expensive, perhaps reflecting these countries' overall macro-economic conditions. The reasons for the recent success in Uganda are, however, still unknown. Comparative research between regions and countries is out of the scope of this study but Box 2 elicits some possible reasons for the differences between East and West Africa by taking a tour in Tanzania, a country without a large domestic dairy industry and relying on extensive livestock system like in Burkina Faso. What emerges is that clear reasons for why imports are soaring in West Africa and remain moderate in the East are very challenging to find.

Figure 15. Milk powder imports in East and West Africa 1975-2013 (tonnes ME)



Source: FAOSTAT, 2017c

[41] See Chapter 3.2, p.31

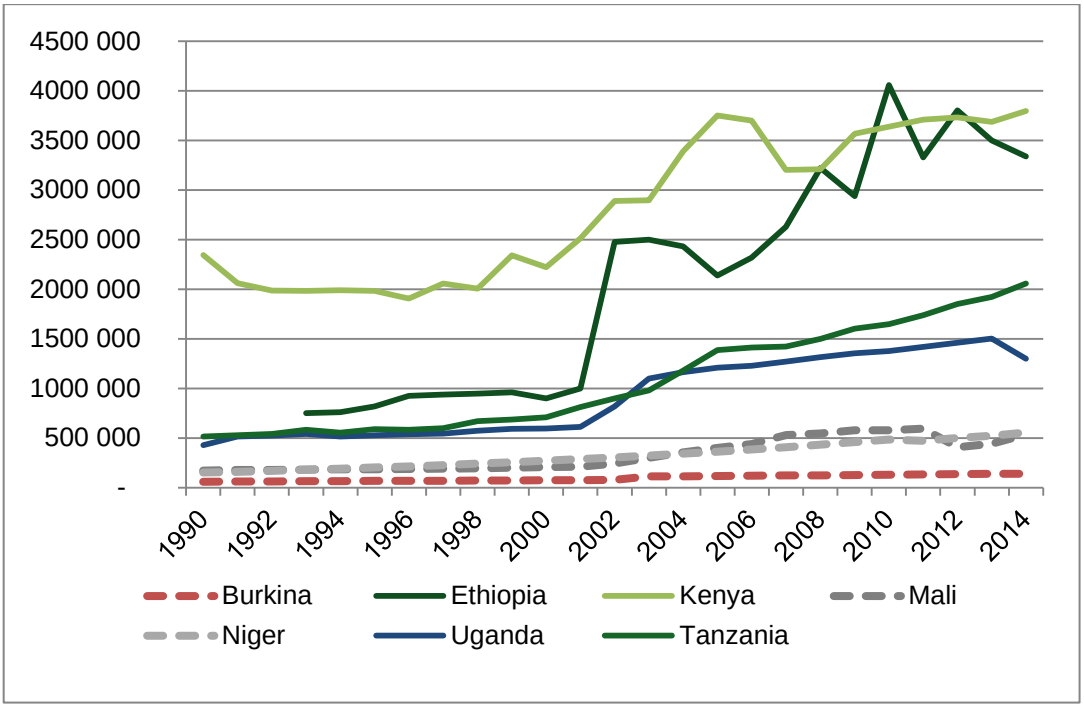
Box 2. Dairy imports in Tanzania

Katijuonga and Nelgen (2014) argue that in Tanzania, a half of the processed dairy products consumed are imported. The ratio is high but still considerably less than in Bobo-Dioulasso, where even the locally produced products are primarily made of imported milk powder. One reason might lie in primary production. For example Ethiopia, Tanzania and Uganda have experienced a noteworthy increase of the domestic production since the 2000s, 3-6 % per year between 2005-2014 (Figure 16), which is clearly faster than in for example Burkina Faso, Mali and Niger.

What might also support the local milk value chain in Tanzania is the traditionally higher per capita consumption of dairy products, around 45 kg/capita/year compared to some 20kg in Burkina Faso (Katijuonga & Nelgen, 2014). Perhaps consumers were more accustomed to drinking local milk when milk powder imports started to surge decades ago. Moreover, extensive dairy food aid and accompanying awareness-raising and advertising in West Africa (see Pinaud, 2014, Ch. 2) were probably influencing consumer preferences also in Burkina Faso, making imported products both accessible and desirable. Consumer statistics cannot, however, explain everything because for example Mali and Niger are among the biggest dairy consumers in West Africa (around 60 kg/capita/year), yet both are importing increasing amounts of milk powder (Duteurtre & Corniaux, 2013).

An easy explanation would be the imposing 60 % import tariff on dairy products from outside the East African Community (EAC) set in 2005, which raised the tariff markedly from previous 25 % (RATES/ASARECA, 2004). However, Figure 15 shows import levels started to fall already in 2000, five years before the introduction of the tariff, but have not seemingly decreased afterwards. Moreover, in July 2017 the EAC decided to significantly lower the tariff, perhaps denoting that it was not considered necessary for the sector (The East African, 2017). One possible factor could be that in the Sahel, the dry season is 7-8 months long, whereas in some areas in Tanzania it represents only 4-5 months of the year. However, also in Tanzania milk processors are struggling with seasonal shortages of milk (Njombe et al., 2011). These are only some of the possible elements that could be further studied in order to trace the reasons for the different development patterns in the East and the West.

Figure 16. Raw milk production in East and West Africa 1990-2014 (tonnes ME)



Source: FAOSTAT, 2017b; MASA, 2013 for Burkina Faso

(NB. FAOSTAT estimates the production in Burkina Faso to around 140 million litres, whereas the national statistics used in this study (MASA, 2013) rise up to 240 million litres.)

Paths for further research

As the literature review showed, dairy imports have been subject to very little research – especially the linkages with local milk value chains. There is therefore no prior evidence if increasing local milk sourcing could affect dairy imports and to what extent. It would be worth investigating what drives the rise of dairy imports in Burkina Faso and in West Africa as a whole: are there any causal relationships between historical changes in import levels and the evolution of local milk value chains? If not, would the answer lie upstream in the global value chain, in extensive production in the global North and perhaps speculative milk powder trading (see Pinaud, 2014, Ch. 4)? Fundamentally, it is a question of the power of singular countries to shape their trade patterns. To what extent can countries such as Burkina Faso influence the global value chain they are embedded in? Do they have a possibility to reinforce food sovereignty within the dairy sector? These remain topics to explore in the future.

7.3 Policy options and private investments

Although curtailing dairy imports seems to be a great challenge, it is worth discussing different policy alternatives that could help the Government to palliate the issue. However, when public resources are scarce, how to justify that it is the milk value chain that should be prioritized among all other sectors? There are other products, such as rice, that are imported in remarkably higher volumes[42] and are thereby a bigger threat for the budgetary balance of the country. There is also no evidence that milk powder would have been directly harmful to the local dairy value chain. On the contrary, the SSMP survey suggests it has generated employment to more than 300 people only in SSMPs of Bobo-Dioulasso, and it helps many fresh milk processors to survive economically when combined with local milk sourcing.

Nonetheless, Chapter 6 showed that local milk sourcing generates more employment than milk powder processing. This is assumed to be of interest to policy-makers in a country like Burkina Faso, prone to un- and underemployment, and it could therefore encourage making further effort for developing the sector. The main policy options, namely improving primary production or processing, changing trade policies and informing consumers, will be discussed next.

Policy options – how would they work?

So far, the policies seem to consider the low productivity of Burkinabe farmers the fundamental problem. Therefore, artificial insemination and vaccination campaigns and importing improved cow races from abroad have been the key actions to strengthen the local milk value chain[43]. However, it is hard to detect any notable progress these programs would have induced. The animal headcount has increased from 7,6 million cows to 9 million in 2005-2014 but the quantities of milk produced are derived directly from the headcount, so there are no data on changes in productivity (MRA, 2015). Key informant interviews suggest that despite some productivity-boosting measures, the actual gains have been reverted by poor adoption of new management practices.

As stated in the literature review, the Government of Burkina Faso has already attempted two kinds of strategies to improve the processing node of the value chain: public semi-industrial dairies and SSMP-led processing. The failure of the first approach became evident in key informant interviews. In 1991, a semi-industrial public dairy was founded in Bobo-

[42] In 2013, rice imports registered by the FAO rose up to 125 million USD compared to 18 million USD spent on milk powder (FAOSTAT, 2017c).

[43] See Chapter 3.1. pp.27-28

Dioulasso but in 2005, it had to close down because it could be no longer subsidized by the Government. One public dairy is still operating in Ouagadougou but it was said to be at risk of closing down in the near future for the same reason. Key informant interviews revealed that the on-going ambitious project to establish a large-scale industrial dairy in Ouagadougou (PDEL/ZPO) is met with some serious scepticism by the stakeholders and beneficiaries – particularly because of the disappointing previous experiences. The case of the project PAPSA[44], then again, paints a grim picture of how also the SSMP strategy can fall short of the objectives if the stakeholders cannot cooperate. And lastly, even industrial-scale local milk processing promoted today does not necessarily lead to decreasing milk powder imports. The true impact is influenced by the choice of products that will be produced and by consumer behaviour. If the future dairy plant in Ouagadougou produced milk powder or concentrated milk (both already widely consumed), consumers might replace the today imported products with new local substitutes. But if the dairy wishes to introduce a new product to the urban masses, as stated in the current plan (UHT milk), it does not necessarily work as a substitute. UHT milk does not have the same attributes as milk powder and concentrated milk, as it should be refrigerated after opening and the taste and texture is different. Perhaps producing UHT milk would increase total dairy consumption but would not reduce milk powder imports.

Besides improving domestic production and processing conditions, some NGOs are calling for trade policy measures, notably higher import tariffs for milk powder, to curb dairy imports (e.g. Oxfam/SOS Faim Belgique, 2016; PASMEP, n.d.). The recently revised import tariffs in ECOWAS (5 % for bulk milk powder) ensure milk powder imports to Burkina Faso will remain cheap, and the Economic Partnership Agreements between ECOWAS and the EU, waiting for ratification, would remove the tariff completely. However, imposing tariffs might not be a reasonable way to reduce imports because they can hurt both consumers (as in Diarra et al., 2013) and SSMPs, for many of whom milk powder might be the only primary material or dairy product they can afford. Although some import tariffs could be worth considering, focusing merely on lowering trade barriers can be short-sighted and might lead to overall welfare losses.

Lastly, some stakeholders recommend informing consumers as a policy measure (e.g. GRET, 2016). According to SSMPs, urban consumers are not aware of whether the yoghurt they buy is made of local milk or milk powder. The SSMPs using fresh milk complain many consumers do not read – or cannot read – what is written on the label and therefore do not

[44] See Box 1 in Chapter 5.3

distinguish between the two products[45]. By raising awareness among consumers, fresh milk-based products could gain appreciation and motivate more processors to source local milk. For some industrial processors in Senegal and Mali, fresh milk processing has facilitated creating niche markets, which has been an important reason for them to opt for local milk (Corniaux et al., 2012b).

Game-changer from the North?

The presented analysis is based on the current circumstances in the dairy value chain in Burkina Faso: SSMPs prevail and industrial units as well as investors from the global North are absent. This is a rather exceptional situation in West Africa. During the last years, especially European dairies have made increasing investments in many countries in the region (Orasmaa et al., 2016). It is therefore worth reflecting whether Burkina Faso could be the next destination.

Western dairy companies must carefully choose the markets they wish to penetrate, and factors such as the business environment, the size of the markets and available infrastructure have to be taken into consideration. According to the Ease of Doing Business Index by the World Bank, start-up and operating conditions in Burkina Faso do not differ markedly from those in other West African countries (World Bank, 2016b), although a simple index can capture only part of the realities investors face. The size of the market, however, might be one of the central reasons why Burkina Faso does not appear the most attractive destination. Because rural markets are predominated by local raw milk (Hamadou & Sanon, 2005), the size of *urban* population becomes an important indicator for estimating the demand for industrial dairy products. In Burkina Faso, only 25 % of the population live in urban areas, compared to 40-50 % in many coastal states where several European dairies are present, e.g. in Senegal and Ivory Coast (UN, 2012). However, the share of urban population is projected to rise in Burkina Faso to around 40 % in 2030 (ibid.), which can be of interest for northern dairies. But also large harbours and more developed infrastructure give advantage for coastal countries. Being landlocked and suffering from increasing instability[46] assumedly reduce the appeal of Burkina Faso in the eyes of investors. And as stated in the literature review, the high poverty rate and lactose intolerance[47] are factors that

[45] Moreover, the distributor survey shows the ingredients are vaguely expressed, as 'Cow milk, sugar, ferment' is used for fresh milk-based and '*Milk*, water, sugar, ferment' for milk powder-based yoghurts. The word 'powder' is never mentioned.

[46] The civil war and unrest in Mali have influenced the security in Burkina Faso. Besides violence close to the frontiers, there have been deadly terrorist attacks in Ouagadougou in 2016 and 2017 (La Croix, 2017). In 2014, massive political uprising provoked violent demonstrations and led to reverting the Government (Chouli, 2016).

[47] See Chapter 3.1 p. 25

make the markets less fruitful for large-scale investments. In the end, a lot depends on the development of other milk powder markets, such as China, Southeast Asia and North Africa that are today in a central role for European dairy producers (European Commission, 2017).

Given the urbanization increases and Burkina Faso makes progress in macroeconomic terms, some northern dairies might become game-changers in Burkina Faso by initiating private industrial-scale dairy production. The way this would change the current situation, however, depends on their production strategy: will they source local milk and if, how will it be done? Most African affiliates of northern dairies use today only imported milk powder (Orasmaa et al., 2016) but evidence shows they could also start local milk sourcing. In Senegal, the French Danone supports a local dairy Laiterie de Berger known for high volumes of local milk sourcing (Veillard, 2015) and the Dutch FrieslandCampina has signed a Memorandum of Understanding with the Government of Nigeria to engage in developing the local dairy sector (Dairy Reporter, 2017). The impacts of these initiatives have not been thoroughly assessed but they imply private investments could help foster local value chains. Overall, Burkina Faso does not rank high, as of today, in investment destinations. Even if northern dairies join the game in the future, the impacts on local milk sourcing, as well as employment and milk powder imports, depend largely on their operating strategy.

CONCLUSIONS

This thesis aimed at analysing the potential of small-scale milk processors to increase local milk sourcing and the expected impacts on employment and milk powder imports in Burkina Faso. It appears that in the city of Bobo-Dioulasso, milk powder undeniably dominates the local markets. In the small-scale milk processing (SSMP) sector, local milk represents only around 11 % of the annual production volume, the rest being processed using milk powder.

The presented analysis suggests that the potential of SSMPs to increase the use of local milk is very limited without assistance. Milk powder processors perceive high economic entry barriers to start local milk sourcing. Interestingly, most processors already using local milk have not had high start-up costs. Such counterfactual perceptions among milk powder processors might be provoked by economic insecurity, although this link cannot be confirmed. While starting local milk sourcing does not seem to require major resources, increasing the collected volumes does, especially because expensive machinery allows processing multiple amounts of milk compared to artisanal equipment. Moreover, the underlying struggle is that local milk is hard to find, at least during the dry season, even for the most successful fresh milk processors. These barriers limit the expansion of the activity and favour the use of milk powder.

Local fresh milk could be made accessible to SSMPs through horizontal and vertical coordination. However so far, value chain actors in Bobo-Dioulasso have proven to be unable or unwilling to cooperate, making it difficult to improve the current upgrading potential. More research is needed to identify how much more milk the producers around Bobo-Dioulasso could sell to processors, in order to better evaluate the potential for growth.

Reflecting these findings to the previous literature, it appears that the barriers hindering local milk sourcing (e.g. income insecurity, lack of credit, unwillingness to cooperate) are common problems among micro- and small enterprises (MSE) in general. Also low education and professional training seem to play a role. Relying on MSEs in order to expand local milk sourcing is therefore a great challenge, and would therefore require assistance. Moreover, because barriers to entry and growth are different from each other, possible development interventions should take these divergent needs into consideration. This supports findings in the previous literature, according to which one-size-fits-all projects can hardly help different kinds of MSEs.

Assistance for local milk processing would be well justified, seeing its possibilities for employment generation. Both milk powder and local milk processors are active recruiters,

contrary to previous findings on microbusinesses. Undoubtedly, also imported milk powder has facilitated self-employment of a mass of microentrepreneurs not interested in fresh milk processing. However, SSMPs that source *local* milk generate income for twice as many people than those using only milk powder (8,8 people vs. 4,5 people, respectively, per 100 litres of dairy production). This is because it provides revenues also to milk suppliers, not only to the SSMP personnel. In contrast to some existing research, the interviewed milk producers consider milk sales their main income. These findings justify the aim of fostering local value chains, instead of relying on imported raw material.

There is limited evidence, however, of the level and stability of income accrued to milk producers. This should be investigated in future research in order to gain a thorough understanding of the employment impact of local milk sourcing. Also comparing the employment generated by SSMPs and industrial processing units would provide precious insight about the socio-economic impacts of these two diverging value chain development strategies.

So far, the influence that developing the local dairy sector has on dairy imports has been subject to little research. This study suggests that despite positive employment impacts, the increased use of local milk is not very likely to curb milk powder imports. Local milk is often used for diversification of product variety, i.e. for processing specific fresh milk products, not for substituting milk powder. Besides, SSMPs seem to process a limited share of the total milk powder imports, so even if for instance a half of the powder were replaced with local milk, the impact on imports would still not be substantial. However, more data are needed on the true volume of dairy imports, especially on fat-filled milk powder, in order to evaluate how the imported quantities evolve in response to changes in the local dairy value chain. Furthermore, future research would need to investigate other uses of milk powder, outside SSMPs. Only then it would be possible to assess which actors could reduce milk powder demand perhaps more effectively than SSMPs. Ultimately, uncovering the actors and measures that have an influence on import levels would help to understand if small countries in the global South, such as Burkina Faso, can reshape the global dairy value chain they are embedded in.

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APPENDICES

Appendix 1. Questionnaires

SSMP survey (head of unit)

Lieu
Nom du répondant (âge)
Jour & heure
Extra note

SECTION 1

	QUESTION	ALTERNATIVES	NOTES
1. Données LAITERIE			
1.1	Nom de laiterie		
1.2	Fondée		
1.3	Fondée par (personne, groupement, organisation, projet, etc.)		
1.4	N. du personnel par tache **(H/F**)		
1.5	Statut	1 Privée 2 Groupe privée (GIE) 3 Coopérative 4 Public/NGO 5 Autre (précisez)	
2. Comptes			
2.1	Capacité de production l/jour (par produit)		
2.2	Production l/jour (moyen, min, max)		
2.3	Production a-t-elle évolué ? Comment ? Pourquoi ?	1 Oui 2 Non	
2.4	Collectez-vous du lait frais ? Combien de l/jour ? (moyen, min, max)	1 Oui 2 Non	

2.5	Quantité de collecte a-t-elle évolué ? Comment ? Pourquoi ?	1 Oui 2 Non	
2.6	Prix payé aux éleveurs FCFA/l ? (moyen, min, max)		
2.7	Achetez-vous de la poudre de lait ? Combien de kg/jour ? (moyen, min, max)	1 Oui 2 Non	
2.8	Prix de la poudre de lait FCFA/kg ? (moyen, min, max)		
2.9	D'où achetez-vous la poudre ?		
2.10	Investissements à la mise en place de la laiterie, FCFA		
2.11	Source principale de financement pour ces investissements ?	1 Crédit d'une banque 2 Crédit d'une connaissance 3 Épargnes 4 Vente de propriété/biens 5 Appui de l'extérieure, précisez (ONG, projet, etc.) 6 Autre, précisez	
2.12	Quels sont les 3 coûts principaux par mois, FCFA ? (loyer, salaires, matière première, emballages, transport, électricité, etc.)		
2.13	Recevez-vous de l'appui financier extérieure ? Combien de FCFA/mois ? Par qui/quel organisation ?	1 Oui 2 Non	
3. Gamme des produits			
3.1	Quels produits préparez-vous en ce moment ? Partie de la production totale par produit ?		
3.2	Prix de chaque produit FCFA/unité (moyen, min, max)		
3.3	Quel est votre équipement ?		
3.4	Gamme des produits a-t-elle changé pendant le fonctionnement du laiterie ? Comment ? Pourquoi ? (Pourquoi ces produits ?)	1 Oui 2 Non	

3.5	Lait frais et la poudre de lait sont-ils mélangés ?	1 Jamais 2 Très rarement 3 Parfois 4 Plutôt souvent 5 Pratique principale	
3.6	La raison principale de l'usage de la poudre ?		
3.7	Combien de poudre/lait frais utilisez-vous pour un litre de yaourt/autre produit ?		
4. Collecte			
COLLECTEURS			
4.1	N. de livreurs de lait (moyen, min, max)		
4.2	Distance des éleveurs de la laiterie km (moyen, max)		
4.3	Comment la collecte est-elle organisée principalement ? Précisez si plusieurs manières.	1 Cherché dans les fermes (précisez le locomotive) 2 Cherché dans des centres de collecte (locomotive) 3 Livrée par les éleveurs (locomotive) 4 Livrée par des intermédiaires (locomotive) 5 Autre (précisez)	
4.4	Avez-vous des contrats de livraison avec des éleveurs ?	1 Oui, oral 2 Oui, écrit 3 Non	
4.5	Fournissez-vous de l'appui pour les éleveurs ? Quel type ? (équipement, fourrage, crédit, etc.)	1 Oui 2 Non	
4.6	Avez-vous des objectifs d'augmenter la quantité collectée ? Combien de l/jour ? D'ici quand ?	1 Oui 2 Non	

SI OUI 4.7	Votre avis : Cet objectif est (choisissez). Pourquoi ?	1 Très difficile d'atteindre 2 Plutôt difficile d'atteindre 3 Possible d'atteindre après plusieurs changements 4 Possible d'atteindre après peu de changements 5 Facile d'atteindre	
SI NON 4.7	Votre avis : Serait-il possible d'augmenter la quantité collectée ? Comment ? Pourquoi non ?	1 Très difficilement faisable 2 Difficilement faisable 3 Ni facile, ni difficile 4 Facilement faisable 5 Très facilement faisable	
4.8	Quels investissements cela nécessiterait ? Coûts FCFA.		
4.9	Autres conditions nécessaires ? (crédit, formation, demande, distributeurs, etc.)		
NON-COLLECTEURS			
4.1	Avez-vous des objectifs de commencer la collecte du lait frais ? Combien de l/jour ? D'ici quand ? Pourquoi ?	1 Oui 2 Non	
SI OUI 4.2	Votre avis : Cet objectif est (choisissez). Pourquoi ?	1 Très difficile d'atteindre 2 Plutôt difficile d'atteindre 3 Possible d'atteindre après plusieurs changements 4 Possible d'atteindre après peu de changements 5 Facile d'atteindre	
SI NON 4.2	Votre avis : Serait-il possible de collecter d'une manière saisonnière (seulement pendant la saison sèche) ? Comment ? Pourquoi non ?	1 Très difficilement faisable 2 Difficilement faisable 3 Ni facile, ni difficile 4 Facilement faisable 5 Très facilement faisable	
4.3	Quels investissements cela nécessiterait ? Coûts FCFA.		

4.4	Autres conditions nécessaires ? (crédit, formation, demande, distributeurs, etc.)		
5. Distribution			
5.1	Où vos produits sont-ils vendus ?		
5.2	N. de chaque type de distributeur		
5.3	Chaînes de distribution ont-ils changé ? Comment ? Pourquoi ?	1 Oui 2 Non	
6. Emploi			
6.1	N. d'heures du travail par personne h/jour (moyen, min, max)		
6.2	Comment avez-vous trouvé votre personnel/membres du groupe ?		
6.3	Y a-t-il des services ou d'autres rémunérations fournis aux salariés (assurances, moyens de transport, unités de communication, produits pour propre consommation, bonifications, etc.) Lesquels ?	1 Oui 2 Non	
6.4	Avez-vous des objectifs d'accroître le n. de salariés ? Combien ? D'ici quand ?	1 Oui 2 Non	
SI OUI 6.5	Votre avis : Cet objectif est (choisissez). Pourquoi ?	1 Très difficile d'atteindre 2 Plutôt difficile d'atteindre 3 Possible d'atteindre après plusieurs changements 4 Possible d'atteindre après peu de changements 5 Facile d'atteindre	
SI NON 6.6	Votre avis : Serait-il possible d'employer plus de personnes ? Comment ? Pourquoi non ?	1 Très difficilement faisable 2 Difficilement faisable 3 Ni facile, ni difficile 4 Facilement faisable 5 Très facilement faisable	
6.7	Qu'est-ce que cela nécessiterait ? Ventes de l/j ? Autres facteurs ? (formation, équipement plus grand, etc.)		

6.8	Avez-vous d'autres objectifs ? (nouveaux services, produits, marchés, techniques, etc.)		

SECTION 2

7. Mise en place			
7.1	Qu'avez-vous fait avant de mettre en place la laiterie ? Continuez-vous toujours ces activités ?	1 Oui 2 Non	
7.2	Avez-vous abandonné quelques autres sources de revenu pour commencer ce travail ? Lesquelles ?	1 Oui 2 Non	
7.3	Avez-vous suivi une formation sur la transformation du lait ? Quel type ? Organisée par qui ? Payée par qui ?	1 Oui 2 Non	
7.4	Quelles étaient vos raisons de commencer ?		
7.5	Mise en place de la laiterie était (choisissez) ? Pourquoi ?	1 Très difficile 2 Plutôt difficile 3 Ni difficile, ni facile 4 Plutôt facile 5 Très facile	
7.6	Quels facteurs ont entravé le plus la mise en place de votre laiterie ? (**cf. verso**) Choisissez 3.		
7.7	Quels facteurs ont facilité ? (**cf. verso**) Choisissez 3.		
8. Situation actuelle			
8.1	Vos conditions d'opérer sont (choisissez). Pourquoi ?	1 Très difficiles 2 Plutôt difficiles 3 Ni difficiles, ni faciles 4 Plutôt faciles 5 Très faciles	
8.2	Quels facteurs ont entravé le plus la mise en place de votre laiterie ? (**cf. verso**) Choisissez 3.		
8.3	Quels facteurs ont facilité ? (**cf. verso**) Choisissez 3.		
8.4	Qu'est-ce vous pensez que la recherche (comme CIRDES) pourrait faire pour vous ?		
8.5	Êtes-vous intéressé à vous rassembler / vous organiser entre les laiteries à Bobo-Dioulasso ? Comment ?	1 Oui 2 Non	

8.6	Avez-vous des questions pour nous ?		

Données personnelles			
	Education	1 Non 2 Primaire 3 Secondaire 4 Tertiaire (NB. Non-complété ou complété)	
	Laiterie est-elle votre source de revenu principale ? Si non, précisez.	1 Oui 2 Non	
	Autres sources de revenu		

Extra		
	Payez-vous des impôts ?	
	Avez-vous vu des changements dans la production ou les marchés laitiers pendant votre carrière ? Lesquels ? Votre avis : Pourquoi ?	

Verso: MISE EN PLACE & SITUATION ACTUELLE

QUELS FACTEURS ONT ENTRAVÉ/ENTRAVENT LE PLUS VOTRE TRAVAIL ?

A. Manque de soutien de la famille
B. Manque de motivation personnelle
C. Difficultés parce que vous êtes femme / homme
D. Hauts coûts d'investissement
E. Hauts coûts mensuels
F. Personnel avec faible compétence
G. Personnel ne travaille pas bien ensemble
H. Faible connaissance sur la gestion d'entreprise
I. Faible connaissance sur la transformation laitière
J. Difficile de trouver du matériel / de l'équipement
K. Difficile de trouver de la matière première (lait/lait en poudre)
L. Difficile de trouver des consommateurs / manque de demande
M. Manque d'autre appui extérieur (projets, ONG, formations, etc.)
N. Autre, précisez

MISE EN PLACE – SITUATION ACTUELLE

QUELS FACTEURS ONT FACILITÉ/FACILITENT LE PLUS VOTRE TRAVAIL ?

A. Soutien de la famille
B. Motivation personnelle
C. Le fait que vous êtes femme / homme
D. Coûts d'investissements sont raisonnables
E. Coûts mensuels sont raisonnable
F. Personnel compétent
G. Personnel travaille bien ensemble
H. Bonne connaissance sur la gestion d'entreprise
I. Bonne connaissance sur la transformation laitière
J. Facile de trouver du matériel / de l'équipement
K. Facile de trouver de la matière première (lait/lait en poudre)
L. Beaucoup de demande / facile de trouver des consommateurs
M. Appui extérieur (projets, ONG, formations, etc.)
N. Autre, précisez

Distributor survey

QUESTIONNAIRE – DISTRIBUTION – Boutiques & supermarchés

Nom du répondant & rôle dans l'entreprise			
Lieu			
Jour & heure			
Extra note			
	QUESTION	ALTERNATIVES	NOTES
1. Ventes			
1.1	Produits laitiers vendus (aussi ceux en poudre de lait) + prix FCFA/unité (moyen, min, max)		
1.2	Quels sont les 3 produits laitiers le plus vendus ? Et le moins vendus ?		

1.3	Votre avis : Pourquoi (produit le plus populaire) est-il le plus populaire ? Pourquoi (produit le moins populaire) est-il le moins populaire ?		
1.4	D'où achetez-vous ces produits ? Chaque produit.		
1.5	Votre gamme des produits laitiers a-t-elle changé ? Comment ? Pourquoi ?	1 Oui 2 Non	

Extra : Discussion		
	Avez-vous vu des changements dans les marchés laitiers pendant votre carrière ? Lesquels ? (produits, prix, demande, vos prix, vos coûts) Votre avis : Pourquoi ?	

Appendix 2. List of interviewees

- SSMPs
    - Powder processors (n = 20)
    - Local milk processors (22)
- Case study interviewees
    - Case A (2)
    - Case B (4)
    - Case C (7)
- Distributors
    - Retailers (20)
    - Wholesalers (8)
- Milk powder importers (5)
- Milk producers (15)
- Key informants (18, see Table A1)
- Farako-Bâ milk collection centre (one group interview with 6 interviewees)
- Workshop (55 participants, see Annex 7)

Table A1. List of key informants

Research	AMPROLAIT	Semi-industrial dairies	Laiterie de Cissin
	CIRAD		Laiterie Faso Kossam
	IRSAT DTA		Laiterie de Koubri
	IRSAT DTA	Policies	DGESS (MRA)
Professional organization	COPROLAIT		FAO (Burkina Faso)
	Interprofession de la filière lait		MRA
	Interprofession de la filière lait		PAPSA (MRA)
	Milk collection centre		PDEL/ZPO (MRA)
	UMPL/B		UEMOA

Appendix 3. Quantitative analysis – significance tests

The significance tests were run in SPSS. Five tests were used: Fisher's exact test, SPSS Exact test for Pearson's Chi square, 2 independent samples *t*-test, Mann-Whitney U test and Kruskal-Wallis test depending on the measured variable. The null-hypothesis was that the responses would be similar in both groups, denoting that the two groups of SSMPs have comparable characteristics and barriers to entry and growth. Alternatively, if significant differences were found, the null-hypothesis could be rejected. These results were later complemented with the qualitative data to obtain the final conclusions.

Four of the five tests (all except 2 independent samples *t*-test) are nonparametric tests, which are more rarely used than parametric significance tests. This requires further justification for choosing these tests, which is outlined below.

Fisher's exact test was applied when the dependent variables were nominal and had only 2 values (e.g. Male/Female, Yes/No). This test can be used when the responses are unequally distributed (only few observations in certain variable combinations), which was the case in this data set.
When the dependent variable has more than two values, Fisher's test cannot be applied. Instead, Pearson's Chi square test was run through SPSS Exact test module. The parametric Chi square test did not conform to this case, as it requires that each combination of variables has at least 5 observations. The nonparametric SPSS Exact test model does not have such assumptions, and was therefore the appropriate option. SPSS Exact test alters the Chi square model and calculates the *p*-value based on actual observations in the data set, instead of relying on parametric assumptions of the distribution of responses. This is expected to give more accurate significance levels when the sample is small (Mehta & Patel, 2012, p.1, 3).
However, Chi square method cannot be applied to continuous variables (Kraska-Miller, 2014, p.52). In these cases, either 2 independent samples *t*-test, Mann-Whitney U test or Kruskal-Wallis test were used. The former is considered more reliable but can be used only when the data are normally distributed and have homogeneity of variances in each samples. These were tested by conducting Shapiro-Wilk test for normality and Levene's test for homogeneity of variances and visually by looking at normal probability plots.
Mann-Whitney U test was used when the data were not normally distributed. Before doing Mann-Whitney U test, one must however assure the data respects the assumption of homogeneity of variances, which was the case in this sample (Nachar, 2008, p.20).
The last test, Kruskal-Wallis test, was used to test the barriers to growth (Figure 9 in Chapter 5.2). Kruskal-Wallis test can be applied in a rather similar manner than Mann-Whitney U test but it allows more than two categories in the variables (Kraska-Miller, 2014, pp.123-124). In this case, the variation in one continuous variable (the quantity of local milk processed annually) was tested against nominal variables (e.g. level of education). Some continuous variables were transformed into nominal by

grouping responses, e.g. the number of personnel was grouped into four categories (1-5 people, 6-10, 11-15, >15). The shortcoming of Kruskal-Wallis test is that one can only see if there is statistical difference between any of the three or four categories but it does not show *which* of the differences is significant.

Appendix 4. Coding results

The qualitative data were compiled together in Word and appropriate codes were given to relevant responses. Altogether 31 codes were created, and they were used 486 times, as presented in the table below. The frequency of codes gives some indication of the importance of each issue but conclusions could be drawn only through 'meaning interpretation' (see Chapter 2.5 p.23).

Code	**n**				
Milk not available	49	Cooperation not working	17	Networking helps	7
Equipment problem	41	Strong demand	14	No demand for local milk	6
Money problem	40	Employing is easy	12	Personnel problem	6
Quality problem	38	Entrepreneurship skills	12	Cultural factor	5
Economic insecurity	31	PAPSA not working	12	PAPSA working	4
Training is important	29	Milk available	11	Equipment is not a problem	3
Gender factor	21	Price problem	11	Local origin of milk matters	3
Counterfactual perception	19	Packaging problem	11	Imported milk problem	2
Credit problem	19	Reliability of milk suppliers	9	Credit available	2
Demand for local milk	19	Cooperation can work	8		
Demand problem	17	Advocacy	7		

Appendix 5. Extrapolation of milk powder processed in Burkina Faso

Calculations based on SSMP survey suggest that the total quantity of milk powder processed in 50 SSMPs identified in Bobo-Dioulasso is 3 000 tonnes ME annually. This includes the 2 100 tonnes ME processed in 31 SSMPs included in the final sample and the remaining 19 SSMPs who were given the median production quantity.

Key informant interviews suggest that four largest dairies in Ouagadougou process together approximately 400 tonnes ME of milk powder per year. Moreover, the number of SSMPs was expected to be two times higher in Ouagadougou than in Bobo-Dioulasso, so the amount processed in SSMPs in Ouagadougou is estimated to be approximately 6 000 tonnes ME, on top of the large semi-industrial processors. Thereby, approximately 9 400 tonnes ME would be processed in Bobo-Dioulasso and Ouagadougou, the two principal cities of Burkina Faso. When the semi-industrial dairy in Fada N'Gourma and SSMPs in minor cities around the country are added (based on key informant interviews), the quantity of milk powder processed annually would be around 10 000 tonnes ME.

Bobo-Dioulasso SSMPs (3 000 tonnes ME)
+ Ouagadougou SSMPs (6 000)
+ Ouagadougou four largest dairies (400)
+ rest of the country (600)
= 10 000 tonnes ME

NB. This still considers only semi-industrial dairies and the kind of SSMPs that could be captured through the sampling strategy. Other processors, such as street vendors and restaurants, are not included. They share they use of the remaining 50 000 tonnes ME imported (Figure 14, p.74) is unknown.

Appendix 6. Workshop program, outcome and participants

Dispositif de Recherche et d'Enseignement en Partenariat

Bobo-Dioulasso,
Le 23 mai 2017

COMPTE-RENDU

Réunion "Améliorer la disponibilité du lait de vache à Bobo-Dioulasso"

Mardi le 16 mai 2017

Salle de réunion de GRAAP, secteur 03, Bobo-Dioulasso

Objet de l'activité:

Rencontre entre les éleveurs, collecteurs et laiteries pour une meilleure organisation de la collecte de lait de vache à Bobo-Dioulasso

Introduction et justification:

Entre février et avril 2017, des enquêtes ont été menées de la part du CIRDES et du CIRAD auprès des laiteries de Bobo-Dioulasso pour évaluer le potentiel des petites laiteries de collecter du lait de vache. Ces enquêtes ont montré un intérêt d'utiliser du lait de vache dans la transformation laitière. Pourtant, de nombreux défis liés à l'approvisionnement en lait empêchent la plupart des laiteries d'en avoir suffisamment toute l'année. Plusieurs laiteries basent leurs activités uniquement sur le lait en poudre et n'ont même pas essayé de collecter du lait local.

Dans le cadre de son projet PAPSA, le Ministère des Ressources Animales (MRA) a construit quatre centres de collecte du lait autour de la ville de Bobo-Dioulasso pour pallier ce problème. Malheureusement, seulement un centre fonctionne à l'heure actuelle.

Dans ce cadre, cette réunion a été initiée pour regrouper des représentants des éleveurs, des collecteurs et des laiteries pour améliorer la collecte du lait de vache autour de la ville de Bobo-Dioulasso.

Les objectifs de cette réunion étaient :

1. de restituer les premiers résultats de l'étude sur l'évaluation de la collecte du lait dans les petites laiteries ;
2. de mettre les différents acteurs en contact ;
3. de présenter les centres de collecte du projet PAPSA ;
4. de discuter des difficultés d'organisation de la collecte du lait et formuler des solutions pour tous les acteurs.

Programme :

- Mots d'accueil
- Présentations : 1. Transformation laitière à Bobo-Dioulasso (CIRDES)
  2. Collecte du lait organisé par PAPSA (Projet d'Amélioration de la Productivité et de la Sécurité Alimentaire) (MRA)
- Interventions
  3. Centre de collecte du lait de Farako-Ba (M. SIDIBE, secrétaire de la coopérative)
  4. Collecte du lait dans une laiterie (Mme SANOU Koumba Lait)
- Interventions
- Travail de groupe : Comment améliorer la collecte du lait à Bobo-Dioulasso ?
- Repas et prière
- Discussion en plénière
- Mots de clôture

Mots d'accueil :

Les participants étaient accueillis par les deux établissements en charge de la réunion, le Ministère des Ressources Animales (MRA) représenté par M. SANOU Suimbou et le Centre International de Recherche-Développement sur l'Élevage en zone Sub-humide (CIRDES), représenté par Mme Tuuli ORASMAA.

Présentations et interventions :

1. Transformation laitière à Bobo-Dioulasso – Mme ORASMAA

Les laiteries de Bobo-Dioulasso ont été enquêtées en février-avril dans le cadre du mémoire de Master de Mme ORASMAA. Les enquêtes ont montré que parmi les 50 unités de transformation laitière identifiées dans la ville de Bobo-Dioulasso, 36 unités utilisent uniquement du lait en poudre. Parmi les 14 unités qui utilisent du lait de vache, la partie du lait de vache dans la production totale est souvent limitée, car la plupart veut garantir la stabilité de sa production avec du lait en poudre.

La taille et le type d'unités sont très variés mais en moyenne, les unités transforment 225 litres de produits laitiers/jour, principalement du yaourt. Elles emploient en moyenne 10 personnes par unité à mi- ou à plein temps. L'équipement est souvent artisanal (casseroles, machines à coller à la main) et la grande majorité travaille avec des fonds propres (seulement quatre laiteries ont pris du crédit).

Les 14 laiteries mentionnées s'intéressent au lait de vache à cause de la demande des clients et aussi pour son goût. Les 36 laiteries qui ne l'utilisent pas trouvent qu'ils n'ont pas de moyens et d'équipement nécessaire pour la transformation du lait de vache. Toutes les unités déplorent que "Le lait ne se trouve pas". Cependant, il a été rappelé qu'autour de Bobo-Dioulasso, il y a plus de 400 éleveurs qui produisent autour de 1 500 tonnes de lait par an[48].

Présentement, le prix du litre de lait livré aux laiteries est de 300-500 F en saison de pluies et de 350-600 F en saison sèche, tandis qu'un litre du lait reconstitué de la poudre ne coûte que 200-325 F/litre (on estime que 1 kg poudre = 7 l lait).

Les laiteries rencontrent des difficultés surtout au niveau d'équipement et du financement et à cause de la non-disponibilité du lait de vache. Cependant, les enquêtes ont montré un intérêt d'utiliser du lait de vache. En général, les laiteries aimeraient coopérer avec d'autres unités mais en pratique, elles le trouvent difficile. En conséquence, la plupart travaille plutôt seul.

[48] Cf. L'étude "Diagnostic des élevages périurbains de production laitière – Typologie des exploitations de la périphérie de Bobo-Dioulasso", conduite par Seyni HAMADOU et al. (2002) dans le cadre du programme PROCORDEL. Disponible à la bibliothèque du CIRDES.

2. Projet PAPSA – M. SANOU

Le projet PAPSA est un projet abrité par trois ministres – Ministère de l'Agriculture, Ministère des Ressources Animales et Ministère de l'Environnement – et il est financé par la Banque Mondiale. Il a été commencé en 2010 et il est présentement dans la deuxième phase (2016-2018).

Le projet se construit autour de 5 filières, dont lait. Dans le domaine du lait, le projet s'est axé sur deux activités : l'insémination artificielle pour améliorer la productivité du bétail et la construction des centres de collecte du lait (CCL) pour améliorer la mise aux marchés du lait produit aux alentours des centres urbains.

Dans la ville de Bobo-Dioulasso, quatre CCL ont été construits sur les axes principaux à la sortie de la ville : Dafinso, Farako-Ba, Sogossagasso, Yegueresso. Actuellement, le CCL de Farako-Ba est le seul qui fonctionne. Le CCL de Yegueresso a marché pour une courte période mais il a vite cédé ses activités.

Une laiterie a été associée avec chaque CCL pour qu'il y ait un marché sûr pour le lait du CCL. Les éleveurs et collecteurs sont censés amener du lait au CCL qui serait ensuite cherché par la laiterie ou un collecteur, pour être transformé dans ladite unité. Comme les CCL ne fonctionnent pas, les laiteries n'ont pas pu profiter du projet et elles ne sont plus en contact avec les CCL.

Les CCL ont été fournis du matériel nécessaire pour le fonctionnement : quelques casseroles et bidons pour chauffer et conserver le lait. M. SANOU regrettait que l'équipement ne soit plus diversifié, car l'idéel serait que les centres auraient aussi des réfrigérateurs et du matériel pour tester la qualité du lait sur place.

Interventions

Ces deux présentations ont suscité une discussion sur les raisons pour lesquelles les trois CCL existants ne fonctionnent pas. M. SANOU a rappelé que le matériel est insuffisant dans les CCL mais qu'en fin de compte, les membres de ces coopératives sont les mieux placés pour répondre à cette question. Pourtant, d'autres réponses n'ont pas été fournies de la part des membres des CCL.

Également, il a été demandé si la disponibilité du lait de vache est exclusivement lié à la collecte du lait. Les représentants du MRA rappelaient qu'il est aussi fortement lié à la productivité, la raison pour laquelle l'insémination artificielle fait partie du projet PAPSA.

3. Centre de collecte du lait de Farako-Ba – SIDIBE Drissa

Le CCL de Farako-Ba fonctionne depuis 2016 mais le groupement existait avant le projet. Dans le groupement, ils collectaient déjà du lait et le vendaient en ville. Le MRA les a sollicité pour prendre part du projet PAPSA. Aujourd'hui, 14 éleveurs livrent leur lait au CCL régulièrement et les quantités reçues sont notées dans le cahier du CCL. Il y a actuellement un client qui prend tout le lait pour le vendre au grand marché de Bobo-Dioulasso.

Les difficultés dans le CCL sont le manque d'eau et de courant, ainsi que le matériel insuffisant. Comme prévu dans le cadre du PAPSA, le CCL est doté des bidons et des casseroles qui sont gardés dans le CCL.

Pendant les derniers 12 mois, le CCL a collecté plus de 17 000 litres de lait, ayant un chiffre d'affaires d'environ 5,6 millions francs l'année passée.

4. Collecte du lait chez Koumba lait – Mme SANOU

Koumba lait est une laiterie d'une vingtaine d'employés (hormis les distributeurs) qui utilise à la fois du lait en poudre et du lait de vache. La laiterie a aujourd'hui cinq collecteurs et deux éleveurs qui leur livrent du lait d'une manière journalière. En saison de pluies, ils emploient un système de rotation où chaque éleveur a des jours de livraison pour éviter l'excès du lait. Les éleveurs/collecteurs sont payés selon leurs préférences : par jour/semaine/quinzaine/mois.

En saison sèche, ils transforment de 80 à 100 litres/jour et en saison de pluies (environ 3 mois) de 180 à 300 litres/jour. Le lait est utilisé exclusivement pour le lait frais pasteurisé mais Koumba lait produit aussi du yaourt et du dégué avec du lait en poudre. Ils payent le lait aujourd'hui (en saison sèche) à 450 F/litre et ils vendent le lait pasteurisé à 500 F/litre.

Koumba lait fait partie de l'Union nationale des minilaiteries qui l'ont fourni p.ex. des emballages biodégradables. La grande difficulté pour la laiterie est le manque du lait quand il faudrait en avoir le plus : en saison sèche.

Interventions

Il a été demandé si le CCL de Farako-Ba transforme leur lait. Actuellement, le lait n'est pas transformé dans le CCL mais leur client le pasteurise chez elle avant de partir au marché pour éviter la fermentation.

Un intervenant demandait quelle laiterie était associée à ce CCL. La laiterie partenaire était Kossam de l'Ouest mais après quelque temps, ils ont arrêté la coopération et aujourd'hui ils ne travaillent plus ensemble. Le public voulait aussi des renseignements sur le prix du lait, qui dans ce CCL est de 400 F en saison sèche et de 300 F en saison de pluies. Le prix est fixé avec le client avant le début de la saison.

Travail de groupe :

Les participants ont été divisés en quatre groupes, dont chacun avait 2-4 représentants des laiteries et 6-7 représentants des CCL. Les discussions en groupe étaient animées par des agents du MRA qui suivaient un guide avec des questions préparées par avance :

1. Êtes-vous intéressé à vous engager dans un centre de collecte ? Pourquoi, pourquoi non?
2. Comment les différents acteurs doivent changer leur comportement pour faire marcher un centre de collecte : éleveurs, collecteurs, laiteries, gérants des centres de collecte ?
3. En dehors du PAPSA, quelles sont les autres solutions pour organiser les marchés du lait ?

Les participants étaient surtout invités à donner leurs propositions au niveau pratique sur comment faire fonctionner le projet PAPSA et/ou quelles autres alternatives il faut considérer pour améliorer la collecte en dehors du PAPSA.

La discussion en groupe était très active et les propos de chaque groupe ont été résumés dans la discussion en plénière.

Groupe 1

Dans ce groupe, tout le monde qui s'exprimait était intéressé par le projet et ils voyaient plusieurs impacts positifs que les CCL peuvent avoir : gain du temps, gains économiques, échanges entre les acteurs et plus facile accès au financement. Quelques participants n'ont pas donné leur avis.

Pour que les CCL puissent fonctionner, il est nécessaire d'avoir des échanges réguliers entre les acteurs, il faut fixer le prix du lait et améliorer les conditions de conservation du lait dans les CCL. Les éleveurs aimeraient avoir d'appui sous plusieurs formes, comme des semences fourragères, l'amélioration des conditions du stockage du fourrage, etc.

Quant aux alternatives pour le PAPSA, le groupe a parlé du crédit aux éleveurs pour améliorer l'alimentation des animaux en saison sèche et du fait que les cantines scolaires devraient être exploités pour augmenter la consommation du lait frais. Cependant, ces activités pourraient être liées aussi au PAPSA.

Groupe 2

Ce groupe montrait beaucoup d'intérêt pour les CCL pour le but d'améliorer la communication entre les éleveurs et les laiteries. Ils ont proposé de créer un bureau qui consisterait des éleveurs, des collecteurs et des transformateurs, car actuellement les différents acteurs ne s'entendent pas. Il faudrait aussi se réunir avec tous les acteurs avant de créer les CCL.

Pour faire fonctionner le projet, ils soulignaient l'importance de la confiance et la communication entre les acteurs. Il faudrait aussi un contrat entre tous les trois acteurs; du matériel dans les CCL pour conserver le lait (congélateurs) et pour tester la qualité du lait; et du courant dans les CCL (énergie solaire). Il a aussi été dit que les acteurs ne communiquent pas leurs besoins au MRA et qu'il faudrait sensibiliser les gens pour augmenter la consommation du lait de vache.

Une remarque a été fait qu'à Dédougou le lait coûte 200-250 F/litre. Un participant aimerait avoir des formations dans la transformation du yaourt avec du lait de vache.

Groupe 3
Les participants aimeraient s'engager dans le PAPSA aussi dans ce groupe. Certains ont précisé qu'ils sont intéressés si le CCL peut couvrir leurs besoins en lait *à tout moment*.
Pour garantir le fonctionnement du CCL, il faut que les éleveurs restent fidèles à leurs coopératives. Du côté des laiteries, il faut qu'elles achètent tout le lait amené aux CCL, à un prix fixe. Un contrat clair, assuré par le MRA, est ainsi nécessaire entre les différentes parties. Les CCL ont aussi besoin du matériel, dont ils ont mentionné l'équipement pour tester la qualité du lait, le matériel pour conserver le lait dans les CCL et même les moyens de transport. Quelques participants ont aussi demandé des formations sur l'alimentation des animaux, l'insémination artificielle et les méthodes de collecte du lait.

Groupe 4
Comme les groupes précédents, ce groupe est intéressé par les CCL, car les centres font rapprocher les différents acteurs. Également, ils faciliteraient le travail en pratique (moins de déplacements) et la communication.
Pour que les CCL fonctionnent, il est primordial de respecter le contrat établi et communiquer clairement entre les acteurs. Le prix du lait doit être fixé par un contrat.
D'une manière général, ce groupe trouve que le PAPSA est la meilleure solution pour organiser la collecte, donc d'autres alternatives n'ont pas été discutées.

Conclusions sur les discussions en groupe
Tout d'abord, il faut noter que plusieurs laiteries sont parties avant les discussions en groupe, surtout celles qui utilisent déjà du lait de vache (au début sept entre elles étaient présentes, dont seulement trois sont restées jusqu'à la fin). Ceci a certainement joué sur le contenu des discussions. La plupart des laiteries qui sont restées n'a pas encore d'expérience dans la collecte du lait et elles ne connaissent pas bien les réalités et les défis de cette activité.
Nous ne pouvons que regretter **l'absence des laiteries expérimentées**, surtout parce que ces mêmes laiteries ont à l'époque été associées avec les CCL. Il aurait été important d'entendre leurs expériences pour que les nouvelles laiteries comprennent les enjeux et pour que les difficultés du projet soient plus claires.
Leur absence peut signaler que 1) elles ne s'intéressent plus au projet PAPSA, et aussi que 2) il est tout à fait possible, quoique difficile, de collecter du lait d'une manière indépendante du projet PAPSA (jusqu'à 300 l/jour comme chez Koumba lait).

En général, **trois éléments récurrents** ressortaient dans les discussions. Premièrement, les participants semblent être très **intéressés par les CCL**. Il faut toutefois atténuer ce constat par le fait que la plupart des laiteries présentes n'utilise pas encore du lait de vache. Ainsi, elles ne sont pas prêtes à s'engager dans le projet avant d'avoir investi dans l'équipement adapté pour la transformation, d'avoir fait une formation sur le lait de vache, d'avoir trouvé des emballages et d'autre matériel pour les nouveaux produits, etc. Pour reprendre ses activités, le PAPSA devrait trouver des laiteries qui sont déjà dans le domaine. Les nouvelles arrivées peuvent rejoindre les CCL une fois qu'elles soient prêtes.

Deuxièmement, on voit que **le comportement des acteurs** (respect du contrat, communication) est au cœur du bon fonctionnement du CCL. La fermeture des trois CCL semble être liée aux problèmes rencontrés à ce niveau. Également, c'est grâce au respect des règles que du CCL du Farako-Ba fonctionne. Pour que les CCL puissent marcher, il faudrait surtout que les personnes impliquées se connaissent et se sentent à l'aise dans le groupement, avant de se lancer dans les activités économiques où les conflits se produisent facilement.

Troisièmement, tous les groupes mentionnent le **besoin d'équipement dans les CCL**, surtout pour conserver le lait et pour en tester la qualité. Le besoin du courant et des réfrigérateurs a aussi été mentionné par le CCL de Farako-Ba. Cependant, comment réaliser cela en pratique ? Il faudrait forcément que ces

réfrigérateurs soient du type solaire (coût du courant élevé, coupures). Cela serait un investissement très cher, tandis que le projet a des moyens limités. Également, on peut atténuer des problèmes de conservation en minimisant le temps que le lait reste au CCL. Par exemple, on peut fixer les horaires de livraison et l'achat du lait. Au début, il est aussi préférable de collecter des quantités limitées pour garantir que tout le lait soit vendu. Ainsi, on peut trouver des solutions au niveau d'organisation de la collecte pour pouvoir travailler avec de l'équipement moins diversifié.

Globalement, les propositions pour faire fonctionner le projet portaient beaucoup sur l'appui au niveau de la production et de la coopérative qui gère les CCL. Ceci peut écouler du fait que les éleveurs étaient plus nombreux dans tous les groupes. Les besoins particuliers pour les laiteries n'étaient pas évoqués lors de la discussion en plénière.
Également, les prix n'ont pas été discutés, probablement parce qu'il n'était pas parmi les questions principales dans le guide des animateurs. Cependant, le prix est l'élément décisif pour tous les acteurs impliqués dans les CCL et il aurait été important de voir comment la fourchette des prix acceptables diffère entre les éleveurs et les laiteries.

Ces discussions ont donné une confirmation que les éleveurs veulent s'engager dans les CCL et qu'il y a un intérêt aussi parmi certains transformateurs. **Cependant, cette réunion n'est que le premier de nombreux rencontres qu'il faut organiser entre les acteurs**, car plusieurs sujets n'ont pas été traités et les groupes n'ont pas pu rentrer dans les détails à cause du temps limité.
Il est regrettable que les laiteries qui transforment déjà du lait de vache ne fussent pas plus nombreuses. Toutefois, les laiteries absentes peuvent être sollicitées plus tard pour les réunions à venir, grâce à la liste de laiteries collectée lors des enquêtes du CIRDES.

Enfin, **les objectifs de la réunion ont été atteints** mais pour trouver des solutions pratiques (l'objectif n. 4), il faut continuer le débat avec tous les acteurs afin de trouver un mode d'organisation convenable pour chaque CCL.

Mots de clôture:

La directrice provinciale du MRA, Mme SIDIBE, a fourni les mots de clôture de la journée. Elle soulignait que la région de Hauts-Bassins est la deuxième région en terme d'effectif du bétail après Sahel. Plus particulièrement, la province de Houet est très performante au niveau de la production laitière. Ainsi, le projet vaut être réactualisé, car il faut que le lait produit soit mis aux marchés pour apporter des revenus aux éleveurs et collecteurs et pour rendre le lait de vache plus disponible aux consommateurs.

Évaluation de la journée :

Points forts
Le bilan a été très positif. Les participants ont surtout apprécié l'occasion de rencontrer d'autres acteurs. Certaines laiteries ont échangé des contacts avec des éleveurs et des collecteurs. Ils ont souhaité que ce type de réunions soient organisées régulièrement. La journée a aussi permis de voir l'état de lieux du projet PAPSA que les éleveurs et certaines laiteries connaissaient mais dont les gens n'avaient pas eu de nouvelles depuis un ou deux ans. La réunion a également motivé les agents du MRA de continuer à travailler sur le projet et va les aider à organiser les deux nouveaux CCL en construction.

Points faibles
Des commentaires négatifs n'ont pas été évoqués mais le fait qu'au moins quatre laiteries sont parties au début de la journée peut indiquer qu'elles ne l'ont pas trouvé utile ou pertinente. Quelques-unes parmi celles qui utilisent le lait de vache ne sont pas venues en premier lieu.
Un des groupes a remarqué que du lait de vache aurait dû être servi pendant le repas.

Liste de présence

n.	Nom	Prénom	Fonction
1	SANON	Souimbou	MRA
2	SANOU	Antoinette	MRA
3	OUEDRAOGO	Moussa	MRA
4	KAMANDO	Elisabeth	MRA
5	SIDIBE		MRA
6	SIDIBE	Diemou	menager
7	YAOGO	Adama	laiterie
8	SAWADOGO	Zacharias	laiterie
9	APIO	Jules	laiterie
10	ADA	Patrice	laiterie
11	SIDIBE	Moumouni	laiterie
12	SAWADOGO	Zakarya	laiterie
13	DOULOUGOU	Fousseni	laiterie
14	YILI	Albert	laiterie
15	SANOU	Kadiatou	laiterie
16	BELEME	Adama	laiterie
17	SAWADOGO	Seydou	laiterie
18	OUEDRAOGO	Harouna	laiterie
19	TOE	Hazara	laiterie
20	DADIRO	T. Sebastien	laiterie
21	SANDAOGO	Moussa	laiterie
22	OUEDRAOGO	Issouf	laiterie
23	TIEMTORE	Boureina	laiterie
24	OUEDRAOGO	Rahim	laiterie
25	SANGARE	Sekou	etudiant
26	TAPSOBA	Abdoul Aziz	etudiant
27	KAWASSE	Hadara	etudiant
28	SANON	K.F. Joseph	etudiant
29	OUATTARA	Siaka	etudiant
30	BARRY	Amadou	eleveur, commercant
31	SANOU	Kalo	eleveur
32	BARRY	Drissa	eleveur
33	DIALLO	Boukary	eleveur
34	SANOU	Ahmed	eleveur
35	DICKO	Amadou	eleveur
36	KONTOGOM	Albert	eleveur
37	SANGARE	Assane	eleveur
38	DIALLO	Boukari	eleveur
39	SIDIBE	Adou	eleveur
40	SIDIBE	Adama	eleveur
41	DIALLO	Nouh	eleveur

42	SIDIBE	Brama	eleveur
43	BARRY	Hackim	eleveur
44	SIDIBE	Hamadou	eleveur
45	KONKOBO	Francois	eleveur
46	DIALLO	Mahmadou	eleveur
47	DICKO	Hamadou	eleveur
48	SIDIBE	Drissa	eleveur
49	SIDIBE	Issa	eleveur
50	SANGARI	Hassan Paterou	eleveur
51	DIALLO	Harouna	collecteur
52	VIDAL	Arielle	CIRAD
53	VALL	Eric	CIRAD
54	BLANCHARD	Mélanie	CIRAD
55	SANOU	Florentin	CIRDES

Appendix 7. Photos

Photo 1. Cattle grazing during the dry season in March

Photo 2. Milk is delivered to SSMPs in plastic containers by motorbike or bicycle. The usual distance is 15-20km.

Photo 3. Fat-filled milk powder at wholesale.


Photo 4. Casseroles and gas stoves (artisanal equipment) for pasteurizing milk or heating water where milk powder is mixed. Usually processing is done at the head of unit's house or in the yard.

Photo 5. Very well equipped SSMP, with an automatic packing machine in the background.

Photo 6. The most consumed dairy product in Bobo-Dioulasso, yoghurt in 100ml bag.

Photo 7. Ready products are delivered to retailers by motorbikes in plastic freezers.

Photo 8. Fully equipped semi-industrial dairy in Ouagadougou.

Photo 9. Part of the participants at the workshop organised with CIRDES and the MRA.

References for Appendix 3

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